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Version 4

MORRIS ISLAND CONSERVATION AREA
MASTER PLAN

Dec 1987

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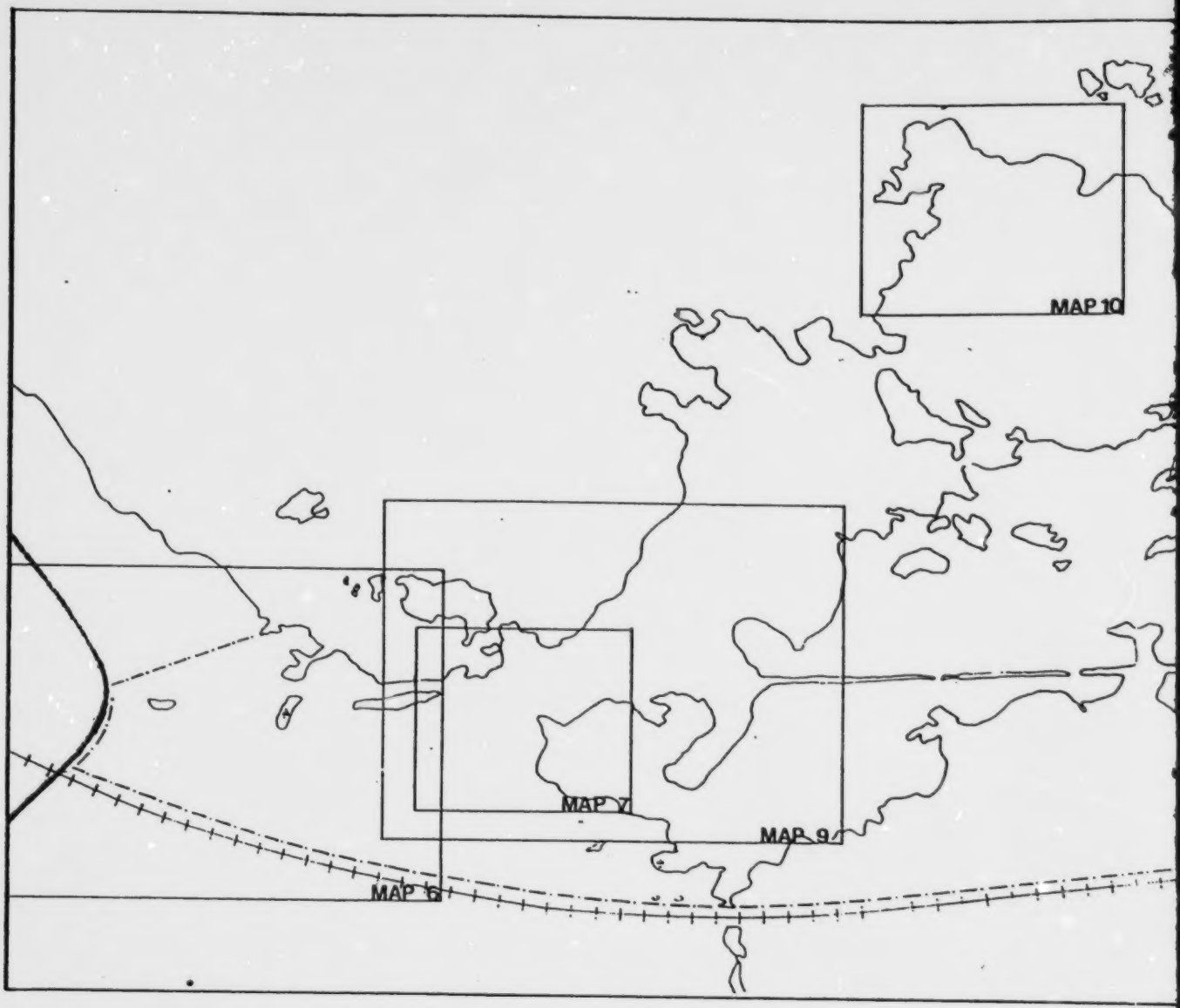
MAP 10
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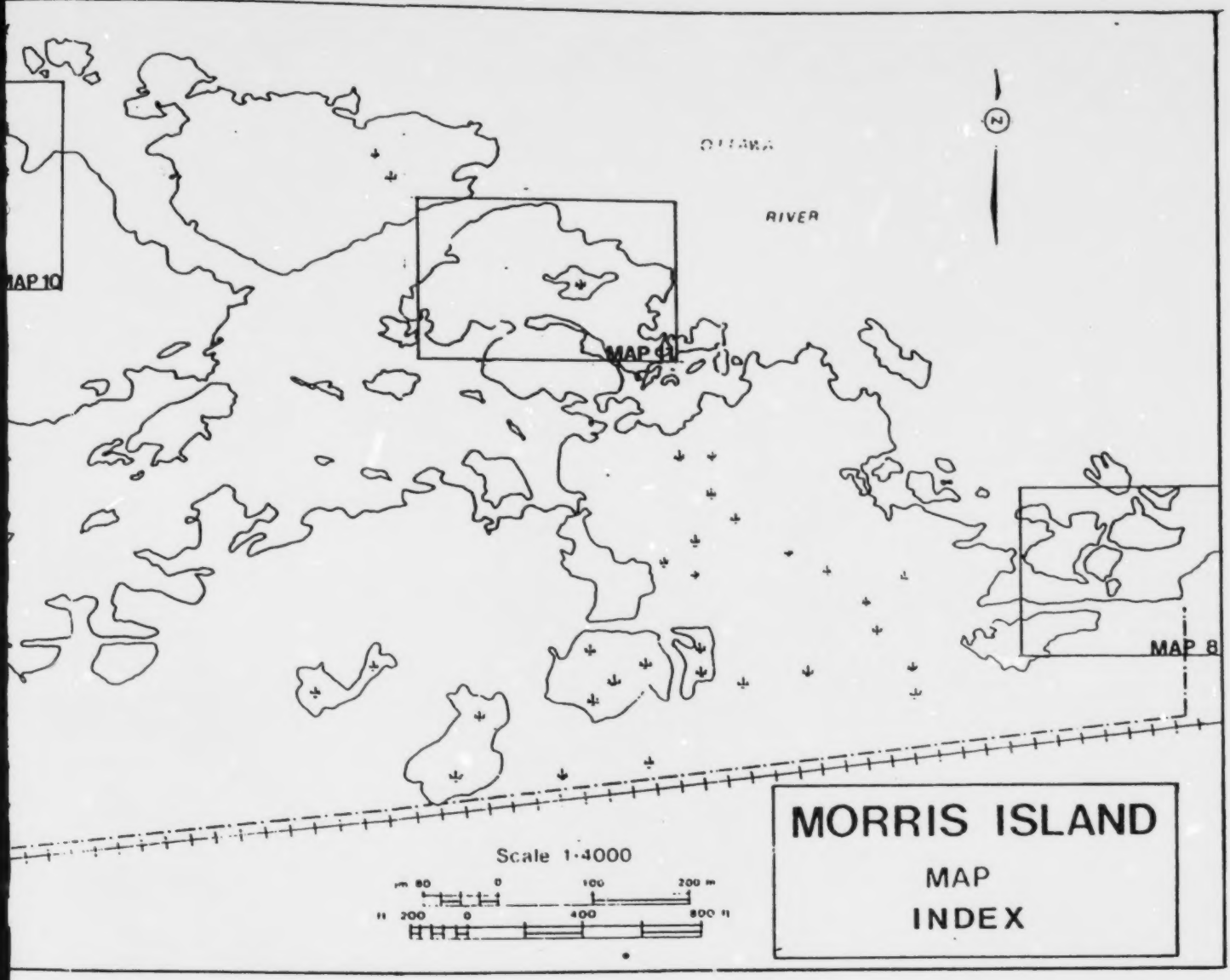
MAP 9
MAP 7


RIVER
MAP 10
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N
Scale 1:4000
m 80 0 100 200 m
ft 200 0 400 800 ft
MORRIS ISLAND
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EXECUTIVE SUMMARY

The Morris Island Conservation Area is located in West Carleton Township, Regional Municipality of Ottawa/Carleton, approximately 50 km west of Ottawa. The 47 hectare site offers spectacular scenic vistas of the Ottawa River, beautiful sheltered bays, and a diverse natural environment. The site is ideal for day-use open air recreation.

The site is presently jointly owned by the Regional Municipality of Ottawa - Carleton, and Ontario Hydro. The entire shoreline and approximately 14 hectares of shoreland is owned by Ontario Hydro, and the remaining 33 hectares belongs to Regional Municipality of Ottawa - Carleton. Development of this site will depend on the agreement of Ontario Hydro to use their land and approval of the Master Plan by the Regional Council of Ottawa - Carleton.

This master plan presents guidelines for the development and management of the Morris Island Conservation Area. It contains background information, goals and objectives, site resources and specific plans for the development, resource management and interpretation of the site. The report concludes with a maintenance and implementation schedule.

Morris Island Conservation Area Objectives

The objectives for this conservation area are to:

1. Preserve a section of the Ottawa River shoreline in its natural state for the benefit and enjoyment of the public.

2. Provide a natural environment year-round, day-use recreation site, with facilities for integrated handicapped users.

3. Promote the conservation ethic and the principles of wise water management with the public.

User Liaison and Target User Group

These objectives are directed towards five groups. These will include local, regional, and seasonal residents, tourists, and special destination groups. Special accommodation will be made for handicapped individuals within these general target groups.

Interpretive media will be provided on site to enhance the users enjoyment and understanding of the conservation area.

Physical and Structural Development

Major site development will occur in 1988 and 89 as follows:

1. Entrance area - double swinging gate which can be locked
   - conservation area sign
   - attractive landscaping & fencing
2. Laneway and parking lot - 30 cars, 4 buses, 4 handicapped parking spaces.
3. Causeway - major reconstruction project for trail use
4. Accessible trail - for handicap use of old railbed and causeway, including 3 lookout platforms, and one bridge.
5. Picnic area - two sites (near parking & on inner bay), total of 8 tables, 2 shelters, 8 B-B-Q pits, 1 washroom with water, 1 pit-style privy.
6. Canoe launch and log boom barriers - restricted small craft access to the inner bay.
7. Trails - approx. 10 km of hiking, skiing and interpretive trails, with lookout areas and benches
8. Area Signage - MVCA standard site information and interpretive signs, and MTC road signs.

Land Management

Protection and management of the conservation area are major concerns. Emphasis will be placed on proper forest management, shoreland management and protection, and on the enhancement and protection of fish and wildlife habitats. The basic approach of the authority is presented in this master plan, and a detailed land management plan will be developed after initial development works have been completed.

Maintenance and Development

A maintenance schedule is outlined in the plan, and it will be executed by the Authority with the usual high quality standard already set for conservation areas. Yearly costs of approximately $5,000 will be an expense of the Authority.

Physical development of the conservation area will cost approximately $120,000, assuming that special employment programs will be available to help offset the cost of construction labour. A detailed break-down of the costs is given in the plan. This project is eligible for contributions from the Regional Municipality of Ottawa-Carleton, and the Ministry of Natural Resources.

Planning and site preparation will be completed during 1987, and initial development will commence in 1988. The majority of work will be done during 1988 and 89, and by 1990 all facilities proposed in this master plan will be in place.

MORRIS ISLAND CONSERVATION AREA MASTER PLAN

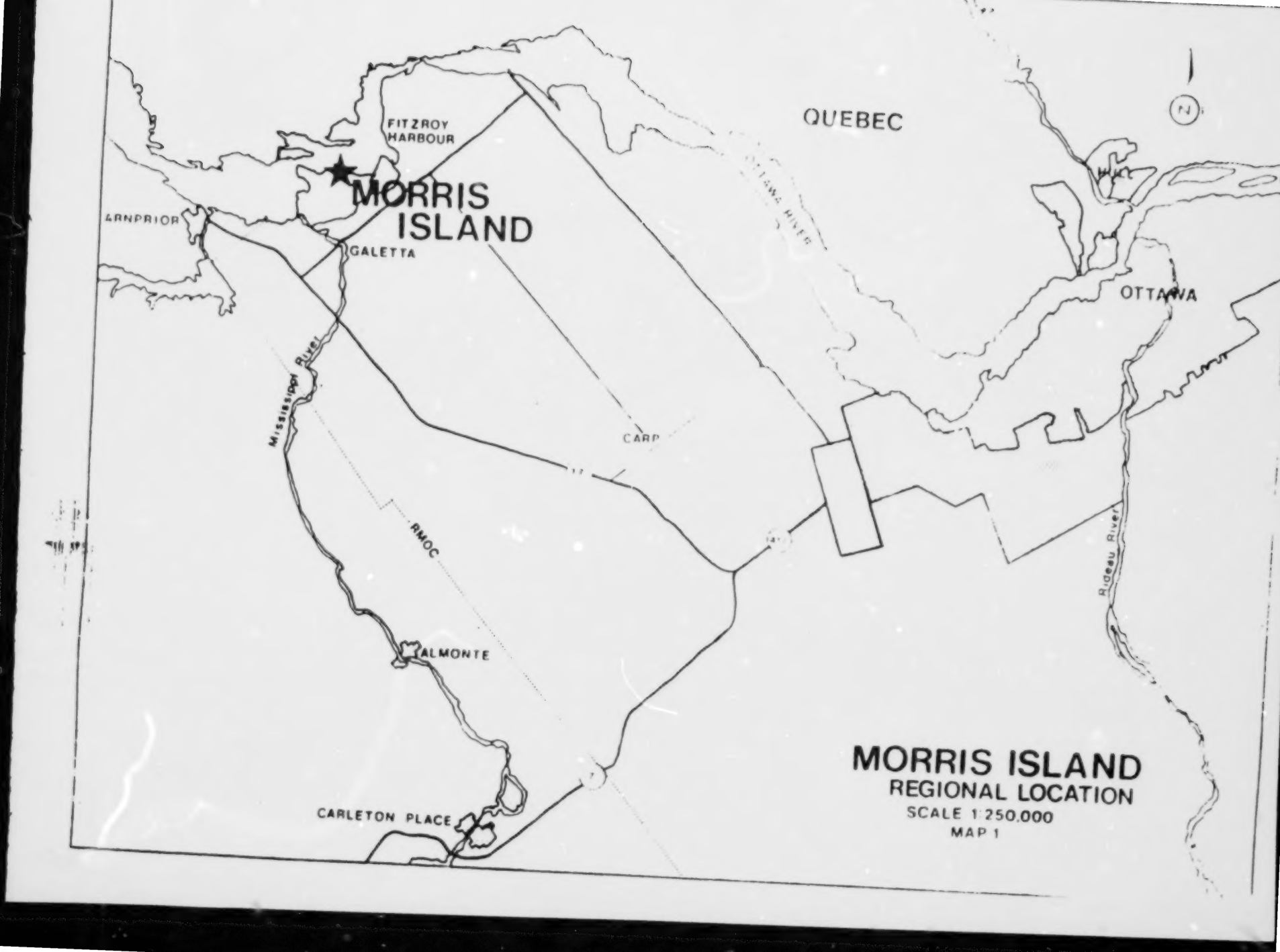
1.0 INTRODUCTION

1.1 BACKGROUND

The Morris Island Conservation Area is located in West Carleton Township at the mouth of the Mississippi River. This conservation area consists of approximately 47 hectares (119 acres) of the island, of which 33 hectares (84 acres) of land are owned by the Regional Municipality of Ottawa-Carleton and 14 hectares (35 acres) are owned by Ontario Hydro as a flood plain for the head pond waters of the Chats Falls Dam. The site offers magnificent views of the Ottawa River, as well as scenic isolated bays and various small off-shore islands. The terrain and natural resources in the area are well suited to natural environment recreational activities and offer excellent interpretation opportunities.

The Conservation Area is located approximately 50 kilometers west of the City of Ottawa on the Ottawa River (see map 1). It consists of portions of lots 25, 26, and 27 of concession 7 and 8 in West Carleton Township of the Regional Municipality of Ottawa Carleton. It is bordered by the Chats Falls Generating Station to the east, the Canadian National Railway to the south, Lavergne Point to the west and the Ottawa River Chats Falls headpond to the north.

The property was first identified in the report, Land Acquisition and Management, Ottawa and Rideau River Corridors, by the Regional Municipality of Ottawa Carleton. This report is referenced in Section 5.4 River Corridors, of the Official Plan of Ottawa Carleton Planning Area. Subsequently a portion of the site was purchased from a local land developer in 1985 by the Regional Municipality of Ottawa-Carleton. The Mississippi Valley Conservation Authority was approached by staff of the Region to participate in the development and operation of the site. Preliminary investigation revealed that development would be greatly restricted if the Ontario Hydro lands were not included for development and they were contacted with the objective of securing a land use agreement. This master plan serves to address the development concerns of all parties. Actual on-site facility designs are included in an effort to assist decision-makers with their assessment of the project and thus facilitate land tenure and funding.


QUEBEC
FITZROY HARBOUR
MORRIS ISLAND
ARNPRIOR
GALETTA
OTTAWA
Mississippi River
CARP
RMOC
ALMONTE
CARLETON PLACE
Rideau River
MORRIS ISLAND
REGIONAL LOCATION
SCALE 1:250,000
MAP 1

1.2 MANDATE OF THE CONSERVATION AUTHORITY

The objects of an authority, as stated in the Conservation Authorities Act, RSO 1980, c. 85, s. 20, are:

> "To establish and undertake, in the area over which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals. R.S.O. 1970, c. 78, s. 19."

The prime objective of the Conservation Authority is water management; however the preservation and development of lands for recreation and conservation is an integral and important secondary service. In the Interim Watershed plan (MVCA, 1982), the following goal was identified:

> "To continue to enhance public enjoyment of the natural environment by promoting and providing a variety of day-use recreation opportunities in which the public can discover, experience and appreciate the distinctive features and elements of the natural resources of the watershed."

1.3 REGIONAL MUNICIPALITY OF OTTAWA/CARLETON INTEREST

In 1978 the Region produced detailed studies of the Ottawa and Rideau Rivers, describing appropriate policies, including management and acquisition. After extensive public review and revision the River Corridors Policies were adopted by Amendment 20 to the Regional Official Plan in 1980.

As a result of the river corridor study a portion of Morris Island was identified for acquisition by the Region and purchased in 1985. The Region's intentions for the use of the site were then set out in the Official Plan, which identified it for various types of water and land based recreation.

The site will be developed in conformity with Regional Policies by providing a suitable range of waterside recreational opportunities, while preserving the scenic value of the river.

1.4 MORRIS ISLAND CONSERVATION AREA OBJECTIVES

The objectives of the Morris Island Conservation Area are further directed by the overall goals of the Conservation and Recreation Land Management Strategy for development and management. The goals and objectives of the conservation area reflect the strategy. They are to:

1. Conserve a section of the Ottawa River shoreline in its natural state for the benefit and enjoyment of the public.

2. Provide a natural environment year-round, day-use recreation site, with facilities for integrated handicapped users.

3. Promote the conservation ethic and the principles of wise water management with the public.

4. Protect unique and sensitive features.

1.5 PURPOSE OF MASTER PLAN

The purpose of this master plan is to provide specific guidelines and schedules for planning and implementing the development and management of the Morris Island Conservation Area. It assesses the resources available, and the user requirements, to determine the nature of development most suitable for the site and then translates this into development designs. This plan will be evaluated on an ongoing basis to determine if the objectives are being met. Activities may be restricted if, in the view of the Mississippi Valley Conservation Authority, the best public interest is not being served.

2.0 RESOURCE INVENTORY

2.1 HISTORICAL/CULTURAL RESOURCES

The Ottawa Valley is rich in history and culture. For centuries the river was a major transportation route for voyageurs, trappers and travellers and an important route for trade with Indians. Toward the late 19th and throughout the 20th centuries, the lumber industry thrived and the river was used for the transportation of logs. Today pulp and paper mills exist locally in Arnprior to the west and in Ottawa to the east.

Chats Falls, adjacent to Morris Island, were historically an obstacle to travel, but because of the waterfall, the village of Fitzroy Harbour became established as a shipping, milling and logging centre. In 1929 the Chats Falls Generating Station was constructed which to this day generates electricity for all parts of Ontario.

A number of mines existed in the area. Kingdon Mine, located on Morris Island, was a 1400 foot shaft mine constructed in 1885, producing pig lead, iron ore and zinc concentrates. It has been idle since 1950. Bristol Mine, located near Pontiac Quebec across the river, was constructed in 1956 and over its 21 year history produced high grade iron ore pellets at a designed rate of 600,000 tons/year.

The railway also played an important role in the historical development of the area. The railway line that transected the conservation area (i.e. the causeway) was abandoned around 1929 when the construction of the hydro dam began and the area was flooded, and a new rail line constructed.

The area surrounding Morris Island has been historically, and is at present, mostly an agricultural based economy. Galetta is the local site for weekly barn and livestock sales and the Antrim, Kinburn and Carp areas constitute some of the best farming in Eastern Ontario. The region is fairly rich in terms of recreational and tourist dollars. Many waterfront regions have traditionally been developed for seasonal residences. More and more, both waterfront and other properties are being used for permanent housing. This has resulted in a loss of public waterfront and therefore indicates there is a need for protection of some of the remaining shoreline property for public use.

2.2 GEOLOGY AND SOILS

The western section of the area consists primarily of Precambrian bedrock which is often exposed or within less than one metre from the ground surface. Rolling hills are typical of the area, exposing gneiss, granite and quartz. The north section of the western peninsula at one time was part of the original river bed, and rocks and bedrock here are smooth surfaced and fracture easily. The rest of the area is primarily highly metamorphosed amphibolite and hornblende compounds with an abundance of calcitic and dolomitic marbles. Marble extrusions are common and large outcrops exist along the causeway. Many sink holes exist throughout the area created by fractures caused by freezing water between layers of rock or by glacial eratics that settled and melted, leaving behind these water filled depressions.

Soils are shallow, easily erodible, acidic humic compounds which due to the topography, are excessively moist and poorly drained. The western section of the conservation area is hillier than the rest, thus creating pockets of bare bedrock and thin layers of forest litter as soil.

2.3 HYDROLOGY

Due to the proximity of the Chats Falls Generating Station, water levels in the area change constantly. As the flood gates are opened to generate hydro electric power, water is drawn out of the area in a distinctive, rapid rate. Water from upstream filters past the railway bridge section of the river slowly because of the shallow narrow channel here. After water is drawn down by the opening of the dam, a time lag exists between the time the water is drawn down and the time the water upstream passes the narrow channel to replace the drawn water. Because of this, water levels fluctuate constantly. This gives the impression that the dam continuously opens and closes throughout the day while it is really opened usually in the morning and then again at night. Water levels can fluctuate up to 0.5 m per day. The operating range for the Chats Falls forebay is 72.24 to 74.22 meters CGD. This represents an average annual fluctuation of approximately 1.9 meters.

Water for the most part within the bay is shallow. Strewn throughout are dead heads, submerged boulders and bedrock. Depending on the water level at the time, most of the area is navigable by non-motorized boat. Seasonally, water levels change greatly as, during spring flood conditions,the dam is left open and water allowed to flow out of the area. During the summer and fall, the amount of water depends on the climatic conditions of that year.

Much of the surrounding area (especially the eastern portion) is excessively wet in the form of marsh and swamp. Evidence of beaver is abundant, contributing largely to this state of flooding. Other areas are flooded due to poor drainage and elevation.

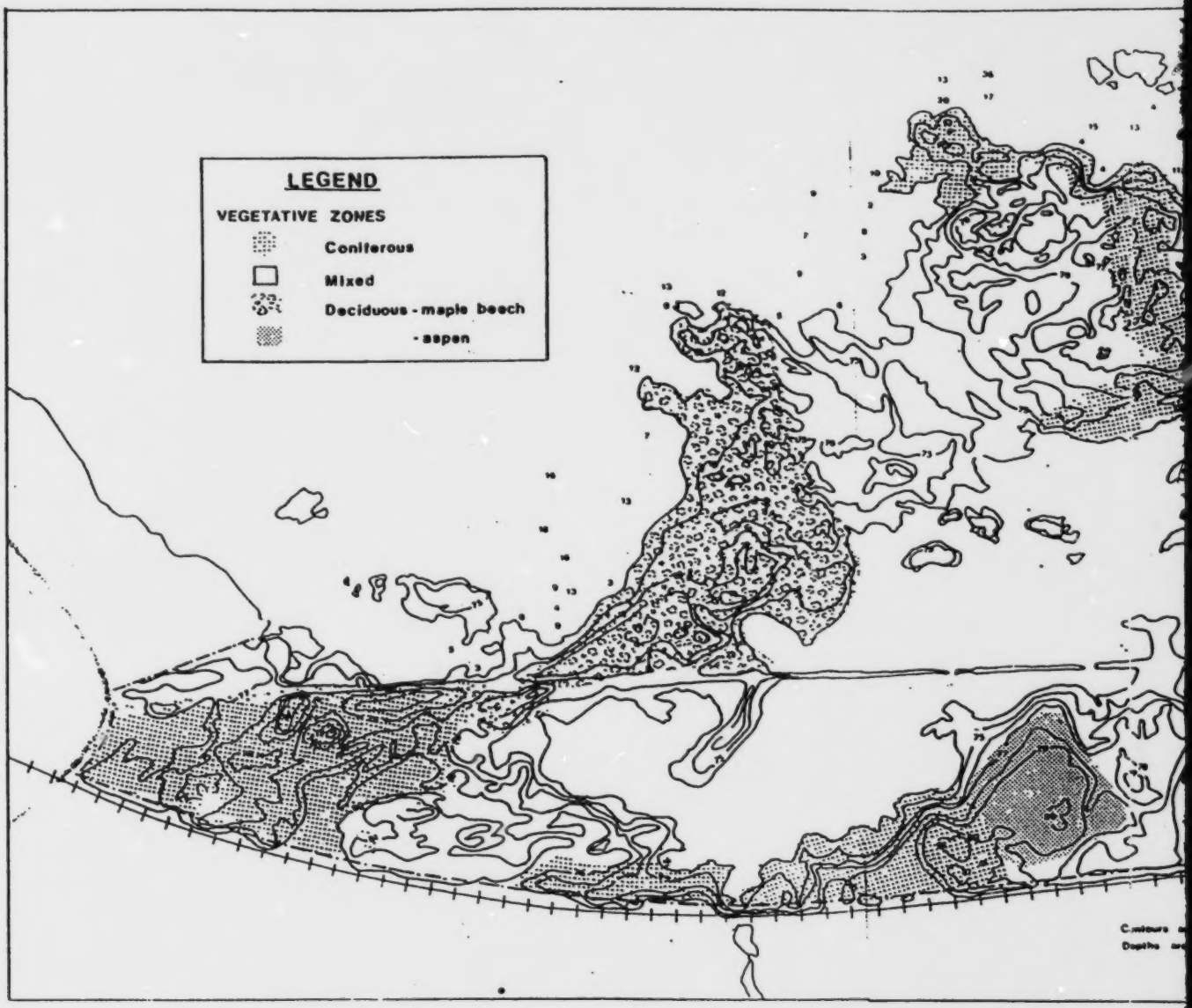
Water quality is generally good. Low faecal counts have been noted and oxygen levels of 12 ppm are not uncommon. The water is relatively clean and clear. Some stagnant water exists in the southernmost area of the bay as it is not as readily flushed as the rest. The beaver dammed areas experience water flow but some swamp areas are stagnant.

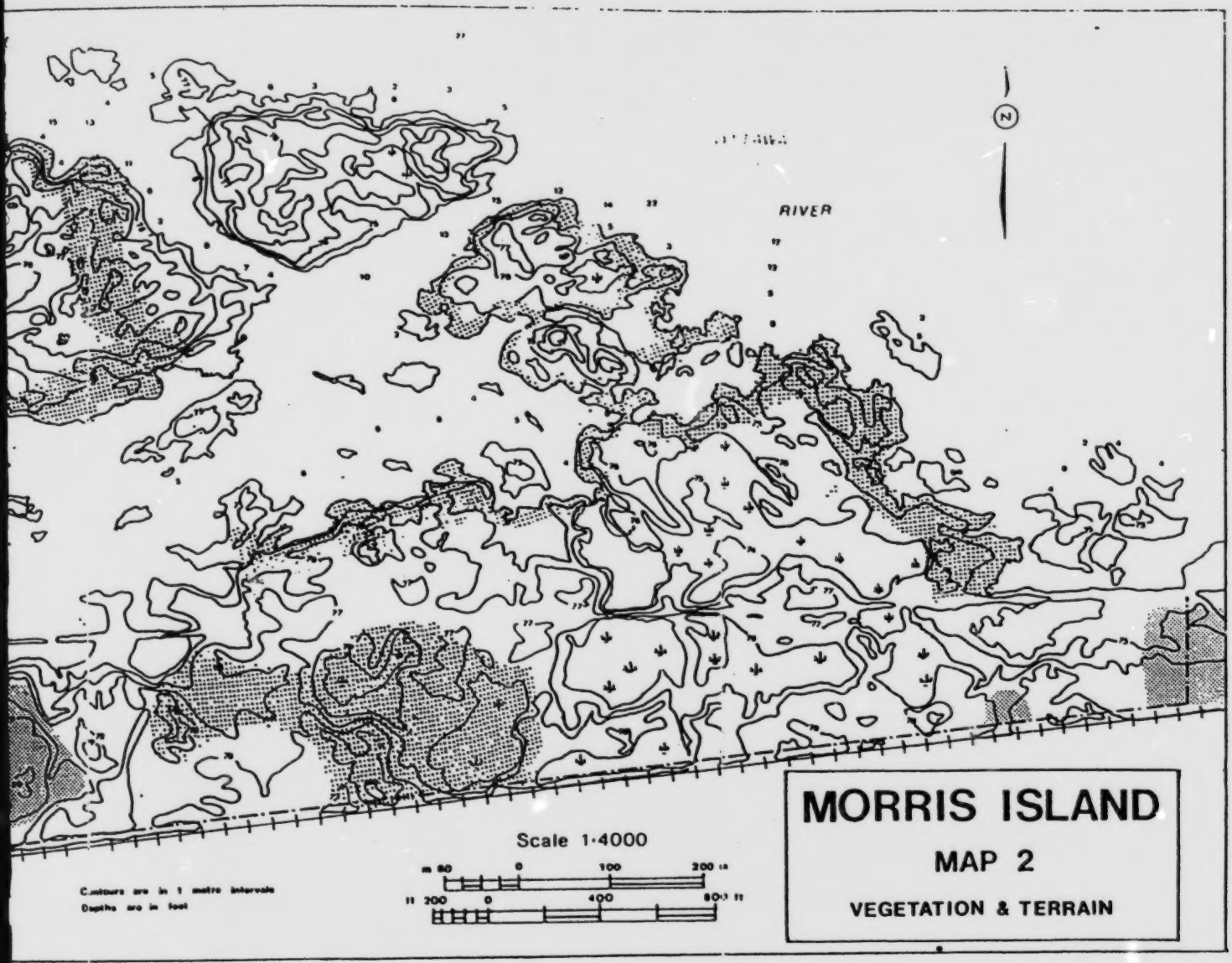
2.4 VEGETATION

The vegetation within the confines of the conservation area are typical of the Canadian Shield of eastern Ontario. Falling within the Great Lakes - St. Lawrence forest region, the area is virtually all dense mixed deciduous/coniferous forest (see map 2).

Mature maple beech forest exists in a portion of the western peninsula and extends to a point south of the causeway. The rest of the western area is comprised of both conifers and deciduous trees. Species such as red oak, large toothed aspen, white cedar, and balsam fir are abundant while bitternut hickory, blue beech and basswood occur in smaller numbers. Pockets of cedar and fir occur in the extreme northern regions of the peninsula.

The rest of the conservation area is primarily mixed deciduous/coniferous forest, with more coniferous species along the water edges of the peninsula and in poor soil areas. East of the southern bay area is a large, distinctive stand (not pure) of large toothed aspen. This area has obviously undergone some form of disturbance in the past. Forest succession would be a good interpretive feature here. Vegetative growth closer to the forest floor is typically dogwoods, speckled alder and striped maple.


LEGEND
VEGETATIVE ZONES
Coniferous
Mixed
Deciduous - maple beach
- aspen


RIVER
N
Scale 1·4000
m 80 0 100 200 m
ft 200 0 400 800 ft
Contours are in 1 metre intervals
Depths are in feet
MORRIS ISLAND
MAP 2
VEGETATION & TERRAIN

Wildflower species vary with location and canopy cover. A good variety of wildflowers prevail on the causeway, primarily those typical of an open field or roadside. Sneezeweed, spotted Joe-Pye weed, turtle head, poison ivy and spotted touch-me-nots are common here. In the forested areas species such as trillium, bracken fern, orchids, iris and red baneberry are common. Mushrooms abound in the region in late summer and early fall, including a number of edible species. Believed to be present are rare species of plants prairie dropseed and riverbank quillwort, as stated in the Atlas of the Rare Vascular Plants of Ontario (1982). (refer to appendix 1 for a partial listing)

2.5 WILDLIFE

The wildlife of the area is a product of the existing terrain and vegetative cover. Small mammals typical here are chipmunks, squirrels and raccoons. Evidence of beaver activity exists and there are at least two active houses. White-tailed deer evidence exists especially in the more remote extremes of both peninsulas. A deer yard exists in the cedar/fir area east of the southern bay, providing food and shelter for deer. It has been reported by local residents that wolves are seen in the area occasionally in the winter. It is believed they cross the river from the Quebec side.

Fishing is a typical activity here at present, pursued primarily by local residents. Pickerel, bass, perch, burbot and pike exist in large quantities. Less attractive species such as bluegill and carp also are present. The bay provides a good environment for fish species as the constant influx of water due to dam operation creates a flushing effect, thus keeping the bay rich in oxygen and nutrients.

A diverse bird population also exists. Game birds, such as ruffed grouse are plentiful, while black and wood ducks are less common but evident in the late fall. It is believed that geese use the area on a migratory route. Colourful bird species such as pileated woodpecker, great blue herons, blue jays and gulls are common in the area, while hawks are less so. No evidence of osprey was noted.

Herptiles such as smooth grass snake, northern water snake and bullfrogs are common, especially along the causeway. (refer to appendix 2 for a partial listing of wildlife)

2.6 CLIMATE

Climatic conditions here are typical of eastern Ontario. Prevailing winds are from the west most of the year. During the winter, colder winds from the Arctic prevail. Southern and eastern winds do occur but are less common, bringing with them warm and/or unsettled conditions. Due to the proximity of water, the air and winds are usually moist.

Because of the extent of forested area here, shade conditions prevail throughout. Exceptions occur along the causeway which receives sunlight all day except for early morning and late afternoon and shoreline areas depending on the time of day. The northern extensions would receive some overhead sunlight during the summer and south facing slopes would receive sunlight most of the time.

Precipitation (rain and snow) here is slightly higher than the average for the province at mean annual amounts of between 800 and 900 mm. (Ontario receives an average of 724mm). Approximately 200cm of snow fall annually.

2.7 AESTHETICS

The natural landscape of the area is aesthetically very pleasing. It offers everything from broad scenic vistas of the Ottawa River and area, to close-at-hand vistas of the natural environment in small sheltered bays. The rich natural resources of the site can intrigue and stimulate the human senses in many ways.

Sounds can vary from virtual silence, with the occasional soft tapping of a far off woodpecker, up to the shrill blast of a train whistle and the clatter on the tracks. The weather can vary immensely to provide the visitor with everything from a bright, sunny, warm summers day, to a cool, crisp eerie morning with the fog hanging low in the bay.

Visually the site is also rich with experiences. In some locations it appears that the visitor is in the wilderness with a rugged shoreline and majestic tall pine trees, while in other areas a person can see the impressive man made structures of the High Falls Generating Station.

The aesthetic quality of this site is of particular importance in light of the fact that considerable amounts of the natural shorelands in the Ottawa Area are being lost to, or altered by development. There is an identified need to preserve and protect areas with special views and beautiful natural environments.

3.0 USER LIAISON AND MARKET ANALYSIS

3.1 CURRENT USE AND DEFINED DEMANDS

This portion of Morris Island has unofficially been used as a recreation area for several years. Although RMOC has only owned the area for a short time, the site has experienced considerable use.

Although a detailed user study was not undertaken, on-site observation and discussion with local users reveals the following. The major user group consists of fishermen, on and off-shore, and small game hunters. There is also considerable evidence that motorized trail bikes and snowmobiles use the area. It appears to a lesser extent, that naturalist and bird-watchers are using this site, and on occasion a group of horseback riders have been seen.

Access to the site is presently attained from the Vydon Acres road, the hydro dam dyke, a small dirt bike trail, and by boat. Users arriving in vehicles drive over the old rail bed, up to the edge of the causeway and park. This has caused considerable erosion and terrain damage to the old rail bed. This use pattern will need to be changed and vehicular traffic given proper direction.

Use of the hydro dam dyke to obtain access from the east is not restricted by hydro. If use is to increase it will be necessary to completely restrict this access. On site observations indicate that the majority of current users obtain access this way, however it is felt that it will be reasonably easy to redirect this traffic once the new access lane and parking lot are established.

The current use of the area by dirt bike riders will not conform with the proposed recreational activities in the conservation area. It will therefore be necessary to restrict access by means of fencing and barriers.

Occasional use of the site is made by boaters fishing the Lac Des Chats section of the Ottawa River. Due to safety concerns this will not be encouraged to continue. No wharf or dock will be provided for access from the Ottawa River. Similarly, no power boat launching ramp will be provided for access to the River.

3.2 MARKET ANALYSIS

Morris Island is situated within a 80 km (50 miles) driving distance of the homes of more than 400,000 people. The largest population concentration occurs in the Metropolitan Ottawa area where current numbers exceed 300,000. The City of Kanata is the closest large urban center, and it is experiencing extensive growth. In addition there are increasing numbers of commuters moving into the rural areas of West Carleton. This is resulting a rapidly increasing numnber or local and regional residents who are potential users of recreational facilities within the Regional Municipality of Ottawa Carleton.

Within this 80 km radius of Morris Island (Ontario only), approximately 32 campgrounds housing about 3260 campsites are in operation. Excluding the NCC and municipal areas, only 7 conservation areas exist (only 3 of which are in the Mississippi Valley) that provide facilities similar to that of Morris Island Conservation Area.

The Morris Island Conservation Area would provide a good compliment to existing campgrounds, for campers and day users alike. Those camping and wishing a longer than usual hike or day users who would like to go "someplace different" for a picnic or leisurely stroll would probably find Morris Island Conservation Area appealing and challenging.

Few facilities for mobily impaired people exist within eastern Ontario. Only two trails developed by the NCC -Sarsparilla Trail in Nepean and Hickory Trail in Gatineau Park- are designed specifically to meet the needs of mobily impaired users.

Fitzroy Provincial Park, located 5km from Morris Island, is equipped with limited handicapped facilities, those being washrooms and showers. If such park users i.e. mobily impaired were attracted to the park, they may well be attracted to a nearby day use area where one can enjoy nature trails, good fishing and informative interpretation programs.

A large number of organizations exist within the Ottawa and surrounding areas that conduct day outings for those not as readily mobile (handicapped or elderly) to whom this conservation area would cater. Such users may be inclined to conduct day outings with more than one destination in mind. The conservation area is in close proximity to a number of towns and tourist type facilities to which these users may be attracted.

The Morris Island Conservation Area, offers a unique riverside environment, an interesting natural area and numerous recreational opportunities which will serve the market demands.

3.3 TARGET USER GROUPS

There are five major user groups which may use the Morris Island Conservation Area. Each group will have specific demands for facilities on the site, and thus must be considered in the initial planning. These groups consist of local, regional and seasonal residents, tourists, and special destination groups. The types of activities pursued by each group vary, but none are mutually exclusive of the other. It will therefore be possible to consider these five groups together as one consolidated target group.

Local residents consist of those people living on the remainder of Morris Island (Vydon Acres), and those from Fitzroy Harbour, Galetta and Arnprior. This group is comprised of a wide range of people; from low to high income levels; from rural families to small town residents; and from young to old. Local area residents are the major present users of the site. Activities include fishing, hunting, boating and snowmobiling, and to a lesser extent nature viewing and horse back riding. This usage has set a precedent for the site and with the exception of hunting and snowmobiling these uses will be accommodated and encouraged at the site. It is felt that attracting the local resident and obtaining their support for the conservation area is of critical importance to the continued success of the site. New services which would be appropriate to fulfill the local users needs would include picnic areas, locations with shoreline fishing access, and facilities to allow canoe access to the bay for fishing. In addition, it is felt that local residents would use hiking and ski trails on special occasions, however this would not be the main attraction to the area for them.

Regional residents are similar in nature to the local resident, however this group encompasses a much larger number and will also include rural dwellers who commute to Ottawa, and urbanites willing to travel to the site from Ottawa. Outdoor recreational activities pursued by this group are too diverse to be addressed at a single site. It will therefore be assumed that general use, as determined suitable for the other members of the target group, will also be supported by regional residents. Special consideration will be needed in promoting the uniqueness of this site in order to attract users from considerable distance for a day use activity. Full-day activities such as hiking, skiing and picnicking will be appropriate services to provide for this group.

Seasonal residents represent a small target group. Cottage and camping development is concentrated around the Ottawa River, both upstream and downstream from the site. Since this user group already has access to general outdoor recreation facilities, activities for this group must offer a special day away from the cottage. Educational and interpretive facilities could provide a special attraction.

The relative proximity of this site to the Trans-Canada Highway indicates that there is a possible market for the tourist user group. Tourists traveling to or from Ottawa may be side-tracked for a short duration day-use activity. Similarly, tourists heading for accommodation at Fitzroy Provincial Park may visit the site for general recreational uses, such as sightseeing or picnicking.

The fifth target user group will be the destination oriented day use group. This group varies in composition from senior citizen and handicap outing groups, to school groups, and from naturalist clubs to sports clubs. Normally they originate from urban centers and travel to a site for a specific purpose. This is potentially a major, important portion of the ultimate target users. A wide variety of general recreation facilities can be offered to this group, keeping in mind the need to accommodate large numbers of visitors at one time. Accommodating elderly and handicap persons will present a special attraction to the site.

3.4 SPECIAL APPLICATION USERS

The nature of the physical resources existing on this site and the proximity to a large urban centre presented an opportunity to provide a unique outdoor recreation site for physically handicapped persons. The goal of this site will not be to provide areas exclusively for these users, but to make it possible for them to enjoy forest recreation opportunities on an equal basis. To this end, several of the facilities are designed for joint use. Specific parking spaces will be defined in the parking lot, and space allowed for wheelchairs to pass through barriers. Within the main picnic area handicap accessible washrooms will be provided, and tables designed to accommodate wheelchairs.

The main trail through the centre of the Conservation Area, will be leveled and packed with a hard surface to provide sure footing for the elderly and very young visitors, as well as visitors in wheelchairs. In addition platforms and benches will be built on this trail so that users can sit and rest, view the scenery, or fish from a bridge or platform.

The site will be promoted to appropriate groups and when possible special events will be initiated to include physically handicapped persons.

3.5 INTERPRETIVE STRATEGY

The interpretive opportunities available at this site will be numerous. Map 3 and appendix 3 provide an indication of scenic and interpretive features which are present. Several themes will be presented to the visitor to enhance their visit and encourage return trips. In addition the usefulness of the site for educational purposes will be augmented through the use of interpretive materials. Six major themes will be emphasised, as follows:

- Forest Ecology and Succession
- The Near-shore Aquatic World
- Flora and Fauna Habitats
- The History of the Chat Falls and Ottawa River
- The History of the Railway and Ontario Hydro on Morris Island
- Floodplain Management

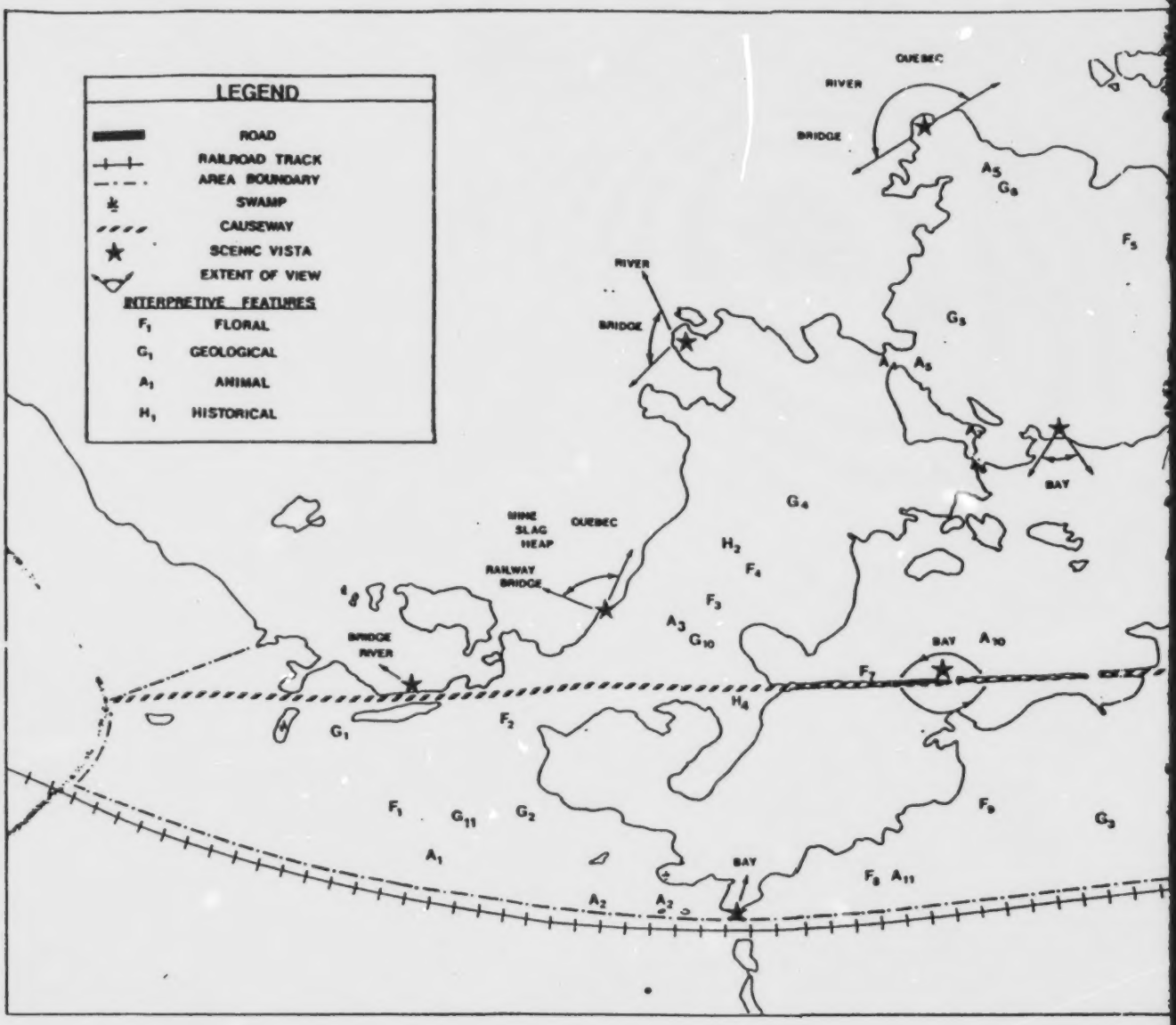
Throughout the Interpretation program, the Authorities message will be communicated, along with a recognition of the role of the RMOC in acquisition and development of the site, and the cooperation of Ontario Hydro.

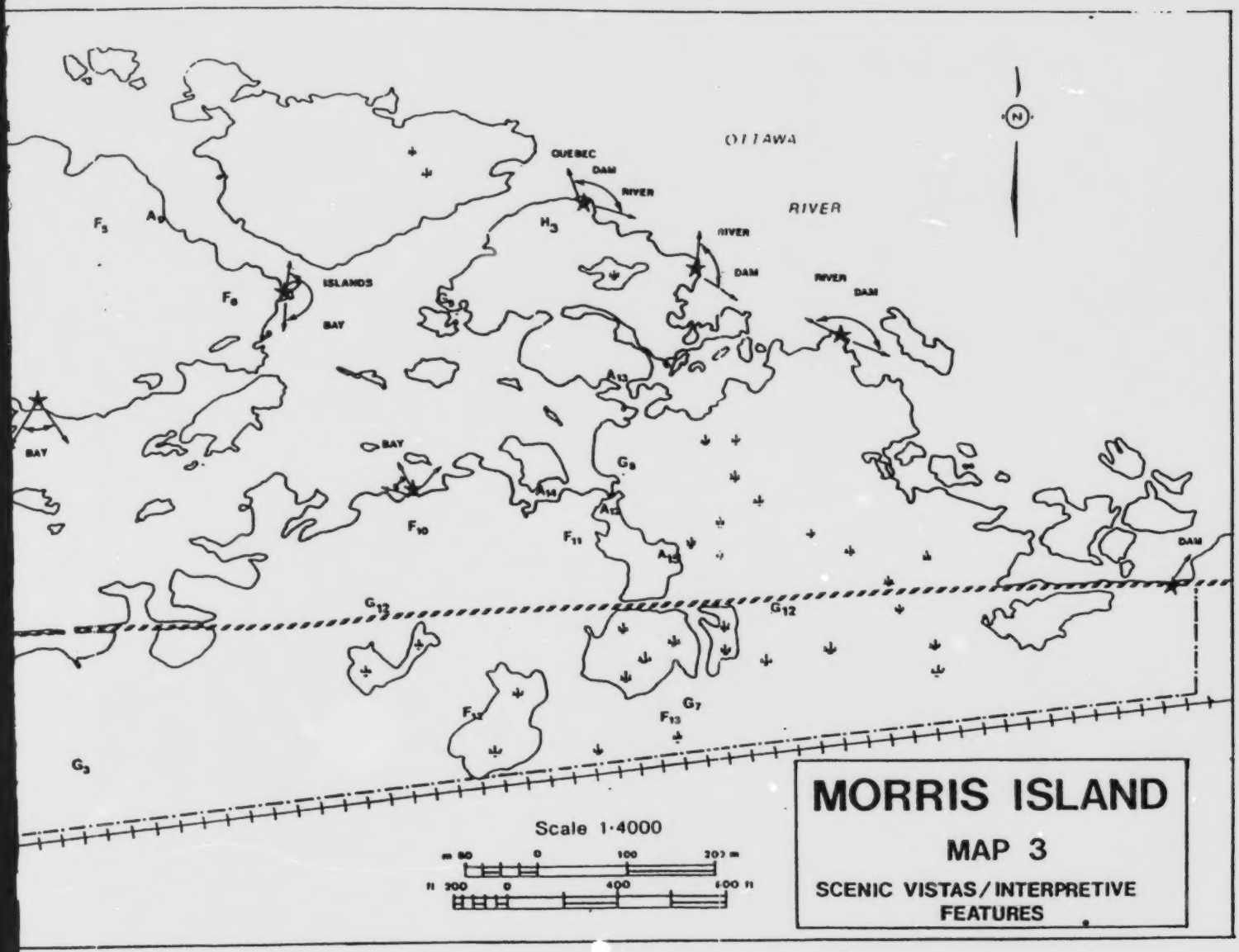
3.5.1 Conservation Authority Message

The Authority has three basic messages for their target groups:

1. Conservation Ethic to instill in the visitor a wise use ethic for natural resources.

2. The role of the Conservation Authority - a statement on the importance of wise water and related land management.


LEGEND
ROAD
RAILROAD TRACK
AREA BOUNDARY
SWAMP
CAUSEWAY
SCENIC VISTA
EXTENT OF VIEW
INTERPRETIVE FEATURES
F1 FLORAL
G1 GEOLOGICAL
A1 ANIMAL
H1 HISTORICAL
QUEBEC
RIVER
BRIDGE
BAY
MINE
SLAG
HEAP
QUEBEC
RAILWAY
BRIDGE
BRIDGE
RIVER
BAY
BAY



MORRIS ISLAND

MAP 3

SCENIC VISTAS / INTERPRETIVE FEATURES

3. Overall care and protection of the Morris Island Conservation Area.

These messages will be translated to the users by providing a high quality, aesthetically pleasing conservation site, and interpretive program to demonstrate the importance of wise management and by providing educational material, and a brochure to explain the Conservation Authority and the unique features of this site.

3.5.2 Promotion

The initial promotional strategy will include press releases, a special issue of the Authority newsletter, interviews in newspapers and on radio, and by word of mouth within the local and regional community. In subsequent years, promotion will come in the form of conservation area brochures, press releases at the opening of the season, and presentations to interested groups. The promotion will be less intensive and become part of the general Mississippi Valley Conservation Authority promotion program.

3.5.3 Official Opening

In the summer of 1988, an official opening of the Morris Island Conservation Area will occur. Those to be invited will include Authority members, RMOC representatives, funding agencies, government officials, local municipal representatives, and members of the general public. An agenda for the event will be prepared nearer to the actual date, to be approved by the Authority Executive.

3.5.4 Interpretive Media

The conservation area will primarily be self-guiding. Visitors will be able to direct themselves by use of trail signs and trail guide brochures. The two trails will be interpreted using the post and pamphlet system (Appendix 4). Other trails will have stationary information signs (Appendix 5 & 6) at strategic locations. For example information related to the Chats Fall Generating Station will be presented on a sign mounted on the rail of a trail platform over looking the Dam. The design and content of the post and pamphlet system, and the text and location for the interpretive signs will be planned and implemented in the summers of 1989-90.

The two post and pamphlet trails will emphasize interpretation of the natural environment themes. The history themes will be interpreted through the general information brochure, and the stationary information signs.

During subsequent years of operation, new interpretive opportunities will be investigated and new media developed on an on-going basis.

3.5.5 Conservation Area Brochure

A general "Morris Island Conservation Area" brochure will be produced to promote and interpret the area. This brochure will outline basic visitor services, the background of the Authority, and help reinforce the conservation message. The brochure itself will be of a style and quality all ready standard for MVCA conservation areas.

3.6 PROPOSED SITE OPERATION

The Morris Island Conservation Area will be open to the public year-round. Due to potentially dangerous water conditions it will however be necessary to restrict the use between the 15th of March and the 15th of May each year. This restriction will include no swimming, canoeing, or accessible use of the causeway.

During emergencies or identified periods of dangerous conditions it will be possible to close the area and lock the gates.

The gates on the site will normally be open between January 1st to May 15th, and October 15th to December 31st, with the main picnic area closed. Between May 15th and October 15th the gates and the washroom facilities will be opened each morning and closed each night.

Warning signs will be posted in dangerous areas and during periods of dangerous conditions. All warning signs will be bilingual. In addition general regulation signs will inform the visitor of restrictions on site use, based on the generic conservation area regulations.

4.0 PHYSICAL AND STRUCTURAL DEVELOPMENT

4.1 ZONES

The Morris Island Conservation Area is characterized by five major geographic and development zones. They are as follows:

- entrance zone
- family picnic and accessible zone
- interpretive trail zone
- natural hiking trail zone
- natural environment zone

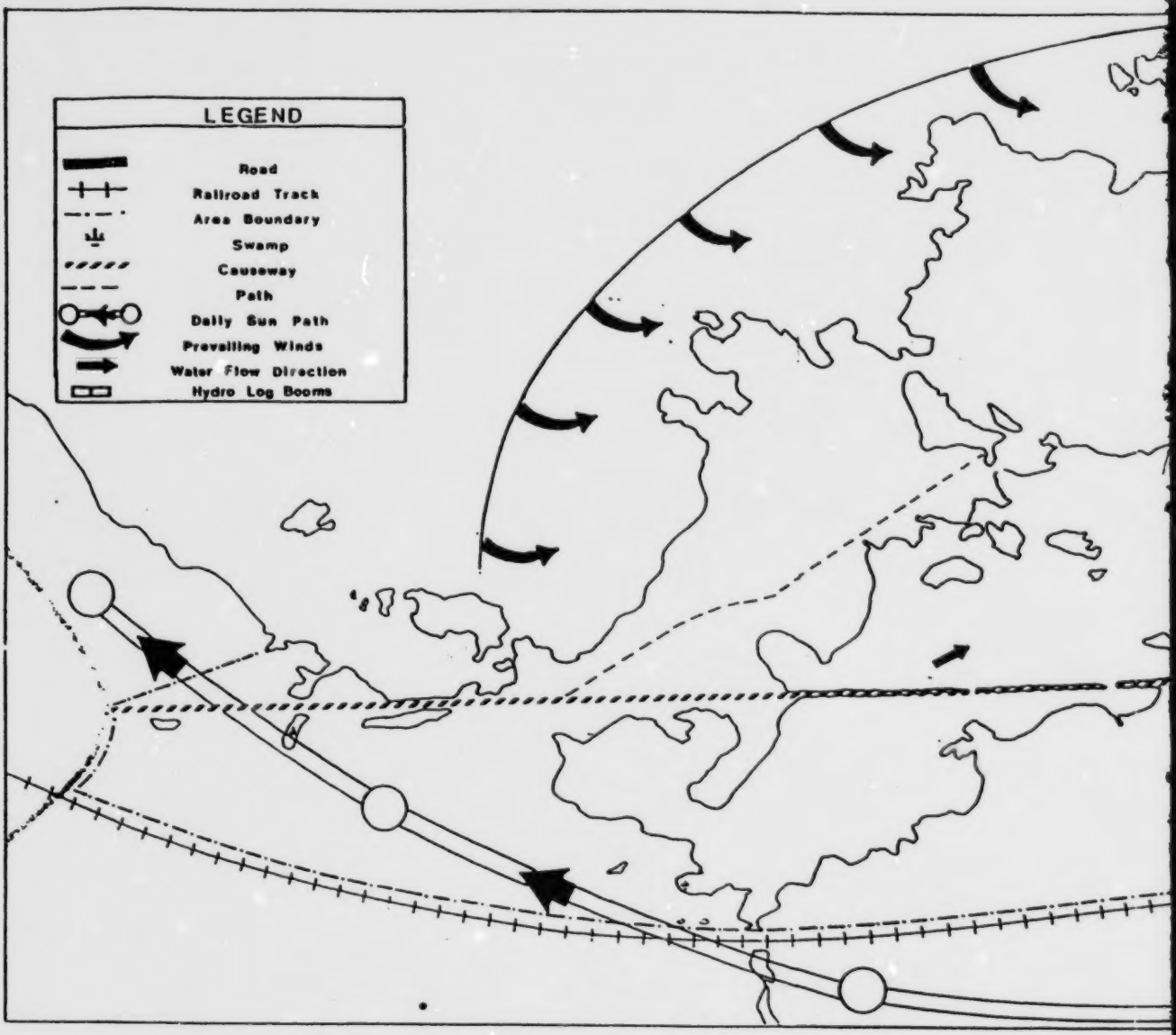
The first zone, entrance, will be strictly service oriented, providing an entrance lane, gate and parking lot with appropriate signs. The second zone will be the major, intensive use area. It contains good scenic vistas, a high quality forested area, and considerable shoreland area. It will provide picnic facilities, and a causeway trail for wheelchair use.

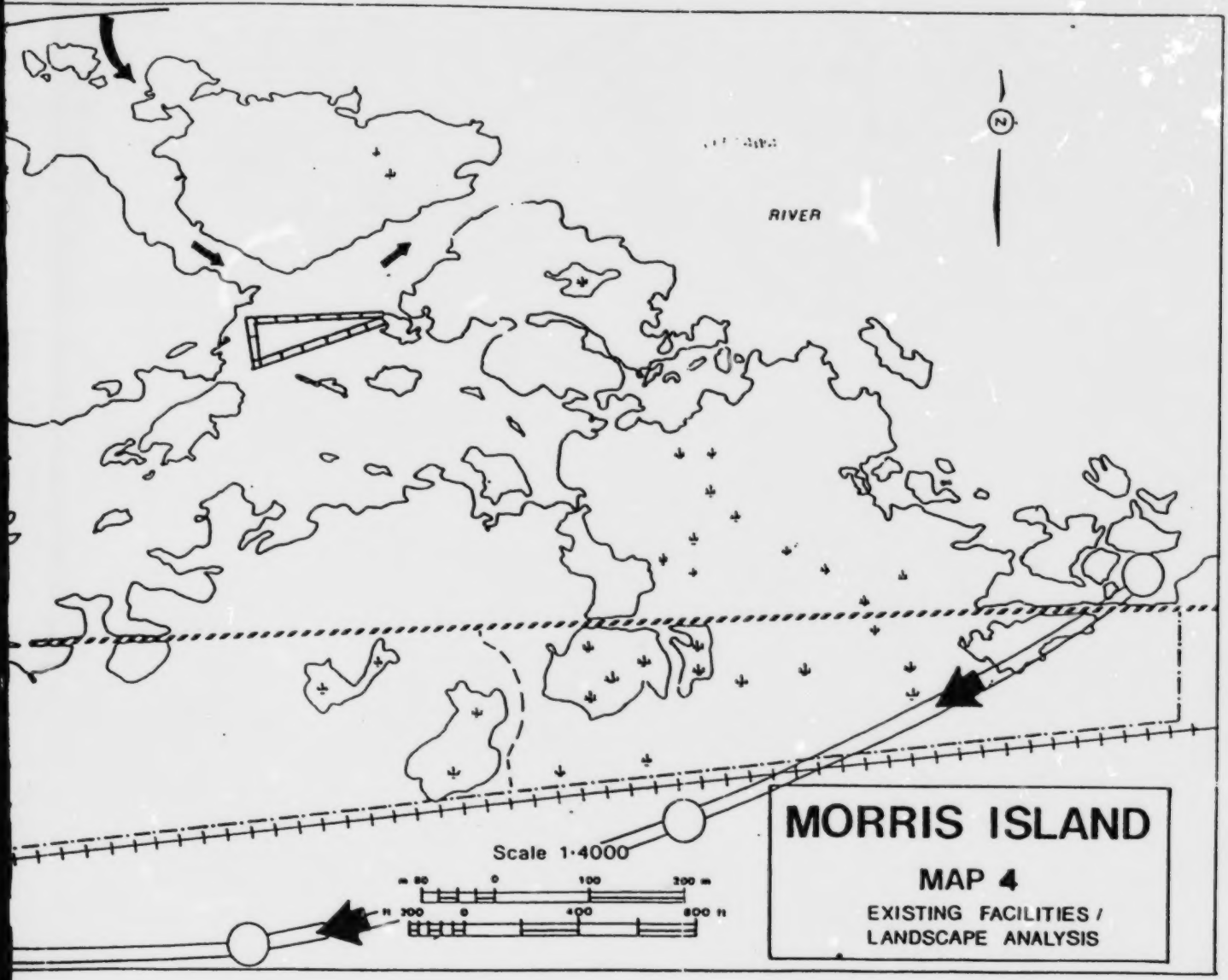
The two trail zones are for natural interpretive, low level recreational use. The first will provide actual interpretive information, such as a post and pamphlet system, and the second zone will simply provide natural environment trails. The final zone will include sensitive areas and the outer islands and will be left natural and undeveloped.

4.2 PRESENT DEVELOPMENT

The Morris Island property is presently being held in its natural state for future park development. The only major evidence of human interference is found in the abandoned rail-line, now used as an access road, and the Ontario Hydro booms and barge, and previous land management.

The area is accessible by the 5 km abandoned railway line that transects the area (see map 4). Access is available from the west by a township road and from the east by the Hydro dam dyke upon which vehicles must drive to reach the causeway. The rail bed, on land, is in good shape and is wide enough to allow vehicular use. Through the bay however, the causeway has been breached in two places by erosion resulting from the constant change in water levels due to the operation of the hydro dam. In some places it is approximately 1 meter (3 ft) wide in total, while only a 15 cm (6 in) wide path is passable.


LEGEND
Road
Railroad Track
Area Boundary
Swamp
Causeway
Path
Daily Sun Path
Prevailing Winds
Water Flow Direction
Hydro Log Booms


RIVER
N
Scale 1·4000
MORRIS ISLAND
MAP 4
EXISTING FACILITIES /
LANDSCAPE ANALYSIS

Two trails exist within the conservation area. The first, located on the western peninsula, was created by the previous owners. It is well travelled and in good condition. The second trail is in the eastern section and extends from the causeway south, crossing the CN railway line.

It appears the area is used frequently by local residents who live either on the island or in the Fitzroy Harbour area. Fishing from the causeway is a popular activity all year round but primarily in the spring. Hunting for grouse, ducks and deer, although not permitted by Township Bylaw, occurs in the fall. Other activities pursued here are wildlife viewing, photography, hiking and perhaps cross country skiing. Evidence of dirt bike and all-terrain vehicle use exists along the causeway all year and snowmobile evidence exists in winter.

4.3 PROPOSED DEVELOPMENT

Map 5 presents the location of each of the following developments.

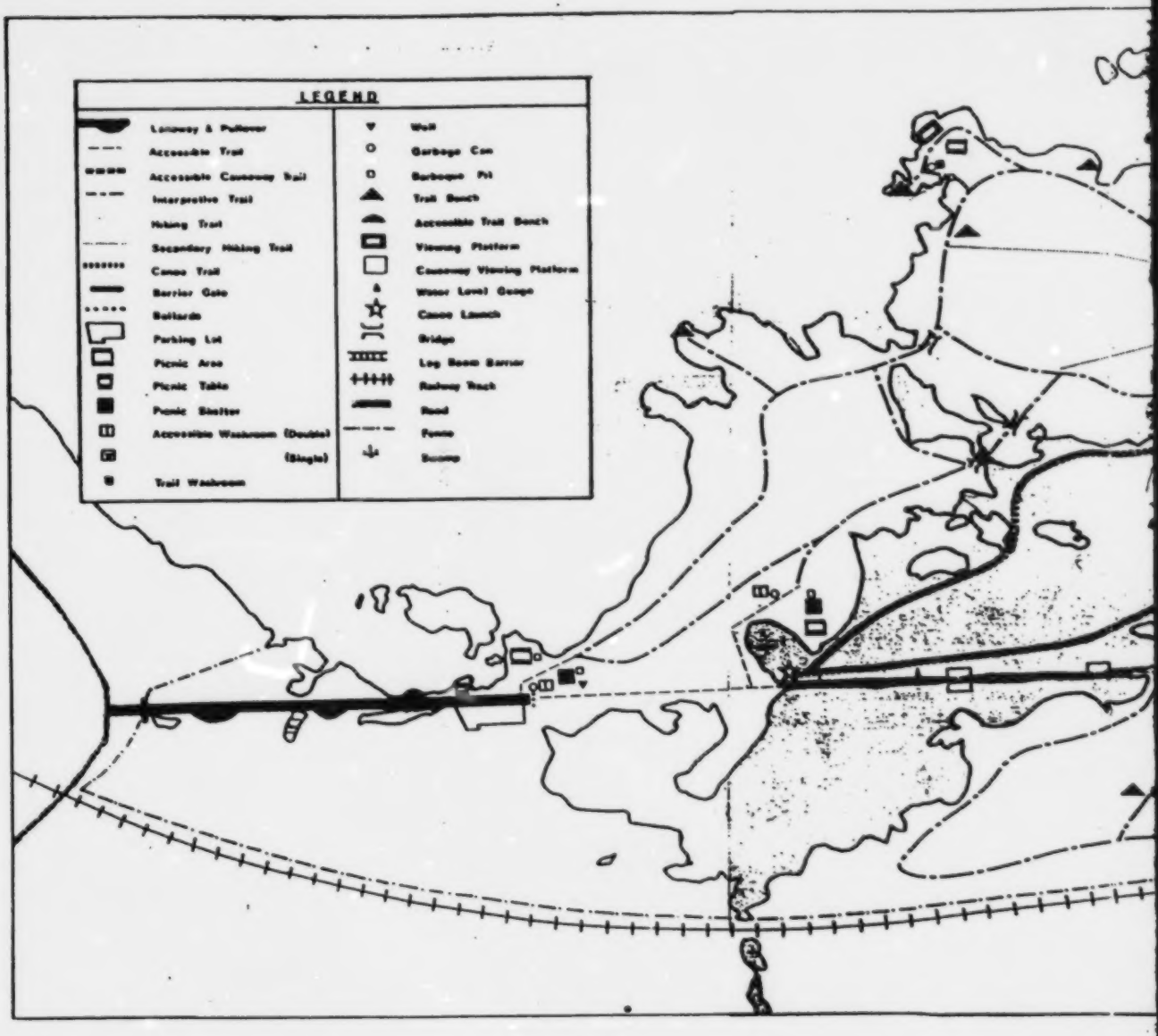
4.3.1 Entrance

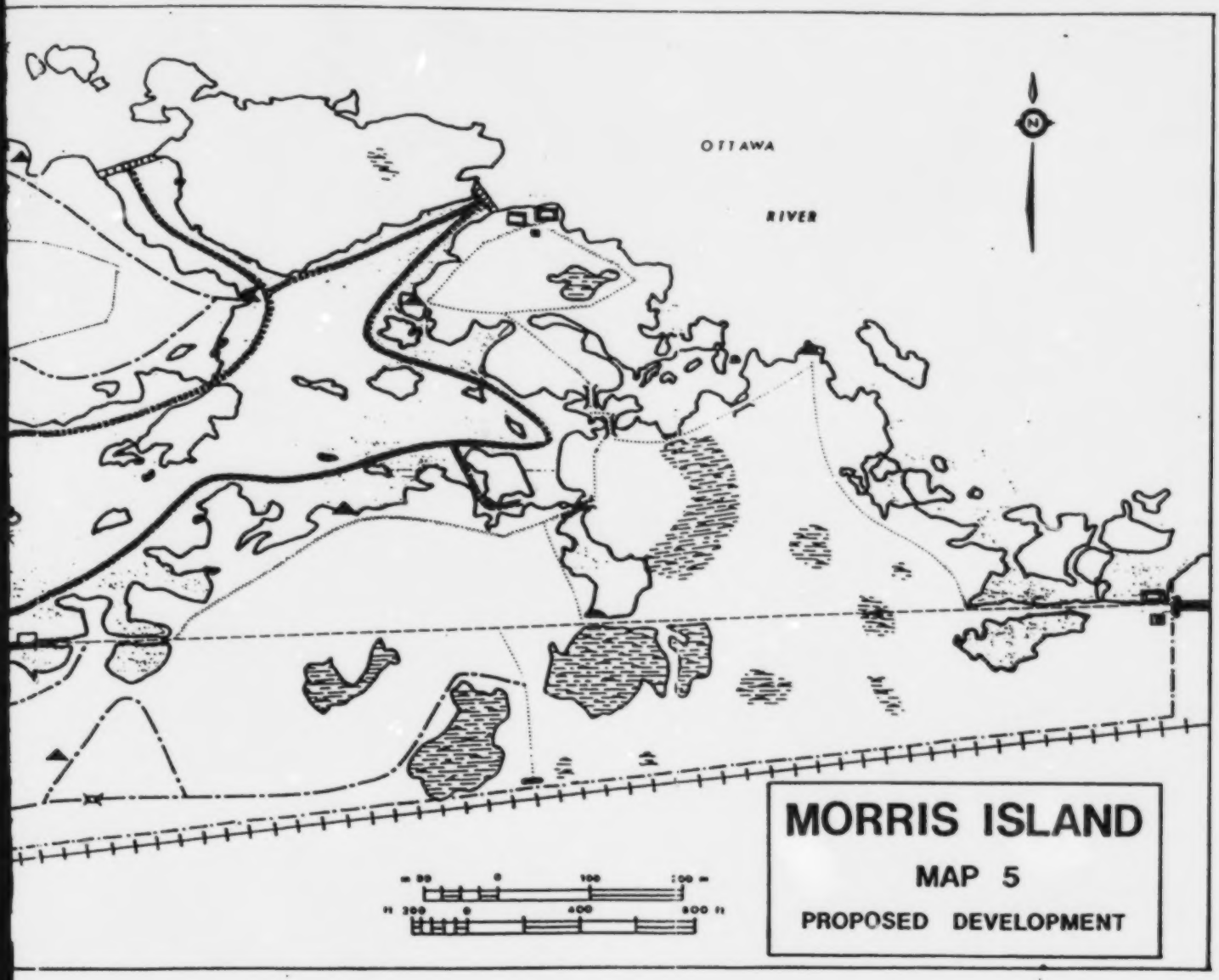
The main entrance to the conservation area will be established on the western edge where the old rail bed meets the Kingdon road. The entrance will consist of a gate, boundary fences, and an introductory sign. The gate will be a double swinging gate, across a double lane, with a locking mechanism. Materials used in the gate will be squared treated timbers, with a barrier post and bracing cemented into a turnpost, and steel fixtures. The fencing along the site boundaries will join the gate so that there is no passage around either end. Fences will consist of natural cedar rails, in keeping with the site. Approximately 280 meters (920 ft) of fence will be needed at the entrance to span from the rail track to the gate and then to the waters edge.

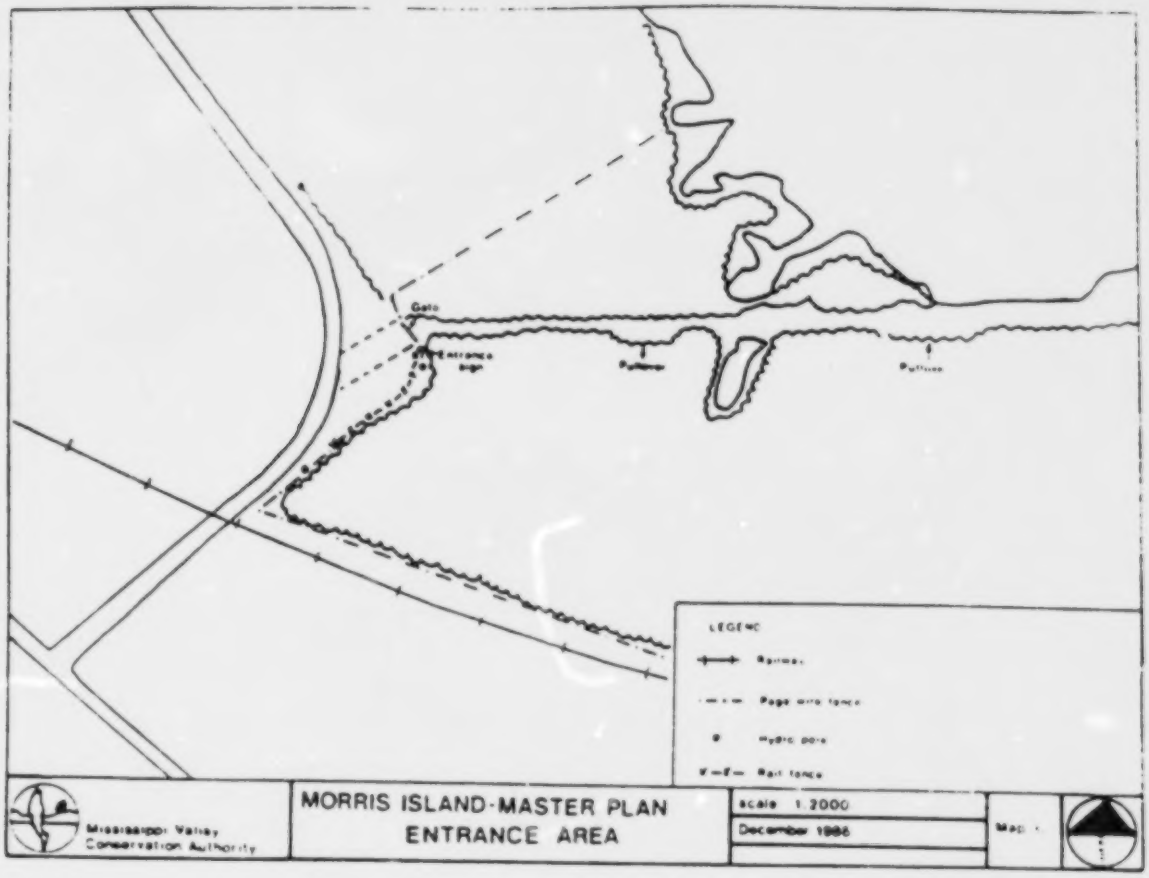
Map 6 provides a site plan for the entrance area and appendices 7 & 8 show the plans for the gate and fence.

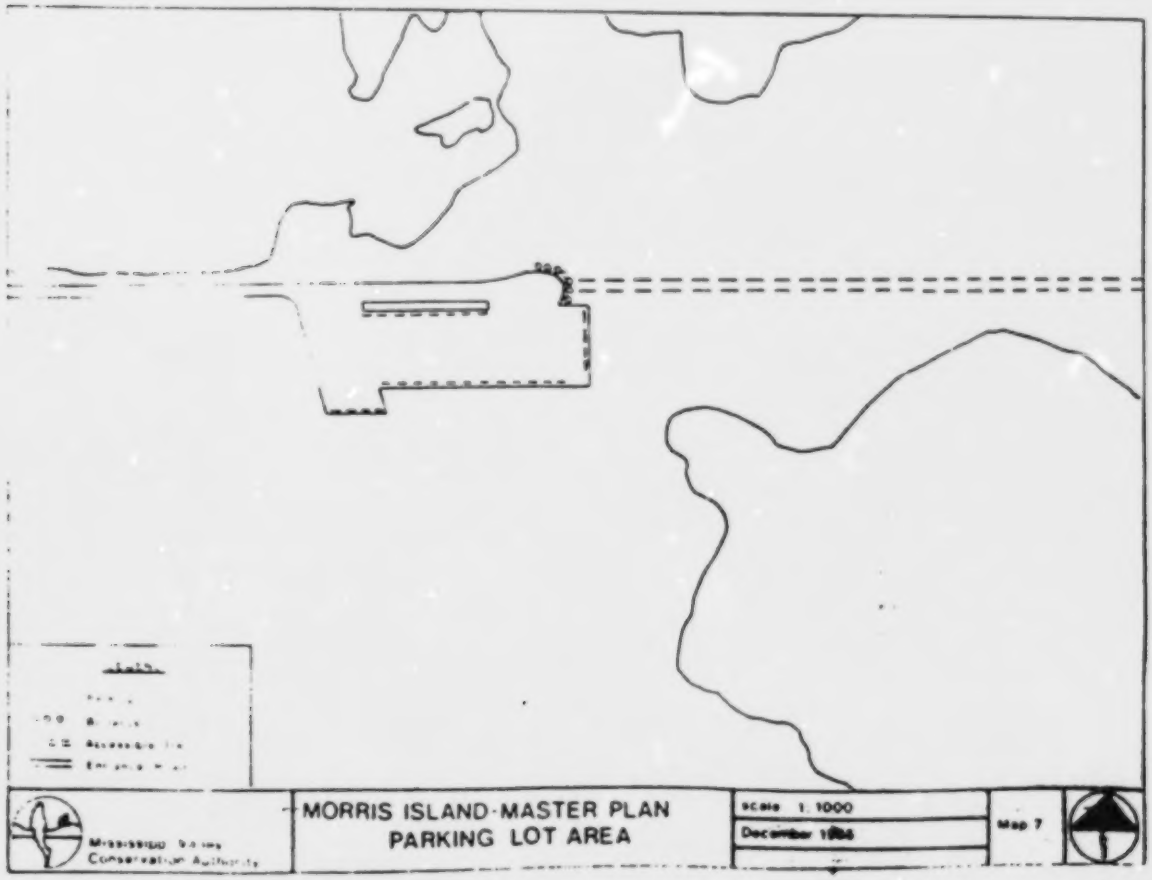
4.3.2 Laneway and Parking Lot

The laneway into the conservation area will follow the existing lane on the old rail bed. The entrance area of this present lane will be levelled and a gentle curve introduced between the gate and the present lane. From the road to the gate and beyond to the curve, the lane will be double width, or approximately 7 meters (20 ft). The lane will then narrow to the existing width for the remainder of its length. Two pull-offs will be constructed to accommodate two way traffic. Signs will be placed at both ends of the lane to warn of single lane traffic. The laneway will be gravel topped and where needed drainage ditches will be constructed. This laneway will be approximately 400 meters (1320 ft) long.


LEGEND
Lookout & Pullover
Accessible Trail
Accessible Causeway Trail
Interpretive Trail
Hiking Trail
Secondary Hiking Trail
Canoe Trail
Barrier Gate
Bollards
Parking Lot
Picnic Area
Picnic Table
Picnic Shelter
Accessible Washroom (Double)
(Single)
Trail Washroom
Well
Garbage Can
Barbeque Pit
Trail Bench
Accessible Trail Bench
Viewing Platform
Causeway Viewing Platform
Water Level Gauge
Canoe Launch
Bridge
Log Boom Barrier
Railway Track
Road
Fence
Swamp


OTTAWA
RIVER
N
MORRIS ISLAND
MAP 5
PROPOSED DEVELOPMENT


Gate
LEGEND
Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
ENTRANCE AREA
scale 1:2000
December 1986
Map 6


Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
PARKING LOT AREA
scale 1:1000
December 1986
Map 7

The parking lot for the conservation area will be located approximately 400 meters (1320 ft) from the entrance, near the causeway and the picnic area. It will accommodate 30 cars and 4 buses or trailers. Adequate turning room will be incorporated to allow vehicles to exit by the same entry laneway. The area outlined for the parking lot will be leveled with a slight (5%) grade toward the water for drainage, with a crushed stone base and topped with gravel. Barriers will be used to provide some definition of parking spots, and a "bus or trailer only" sign used to segregate the two areas. The four parking spaces nearest the trail will be designated for handicap user parking, and adequate space left to manoeuver wheelchairs through the barriers.

Map 7 provides a site plan for the lane and parking areas and Appendices 9 to 11 show the plans for these facilities.

4.3.3 Causeway

An old railway bed which spans from the east to the west side of the conservation area, is of critical importance to the overall useability of this site, since it provides the only trail to the eastern side of the area. In the central portion of the area is a causeway, across a large bay. At present the eroded causeway has been breached at two points and is no longer passable. A considerable flow of water now passes through the causeway indicating that two sets of culverts will be needed within the rebuilt causeway. The design for the causeway is presented in the engineering report in the appendix and the design for the trail, culvert bridges, and viewing platforms are discussed in the Accessible trail section of the plan.

Detailed engineering design drawings and a report are included in appendix 32.

4.3.4 Accessible Trail

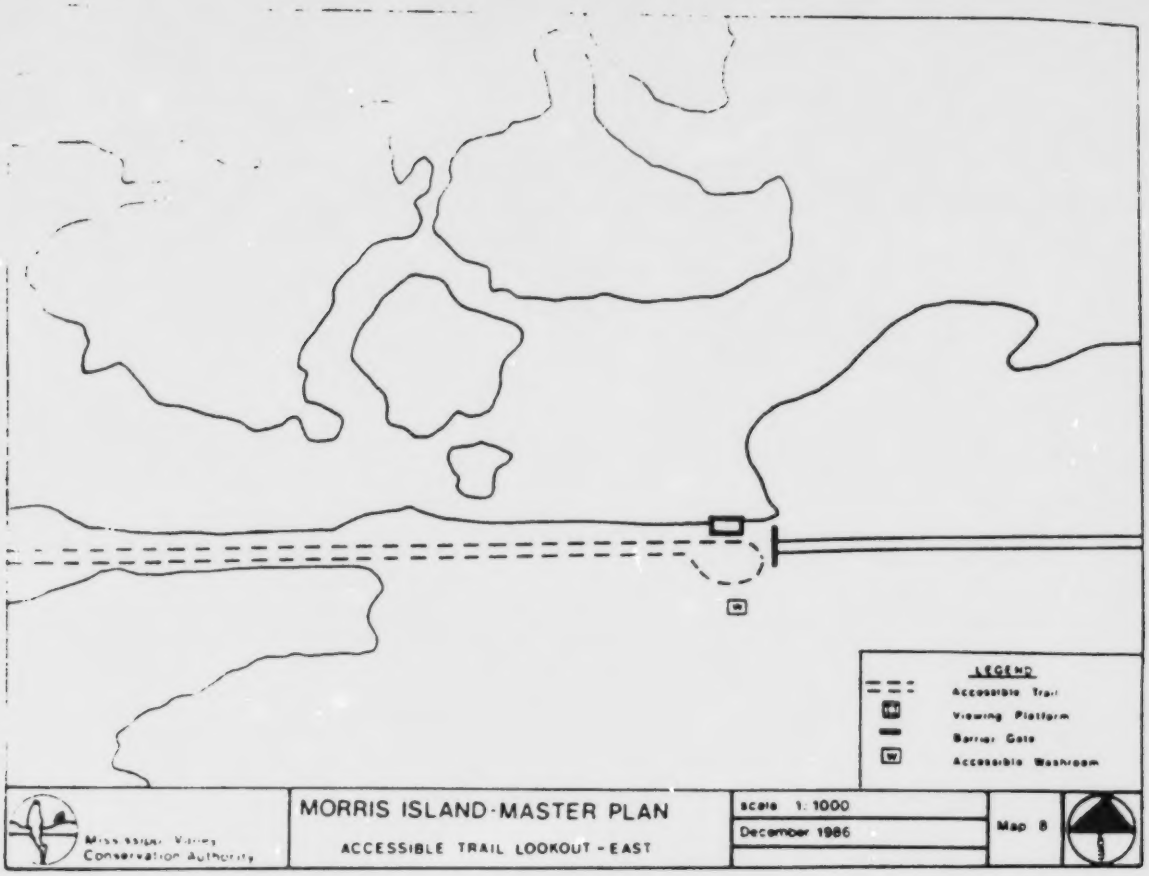
The relatively flat and straight nature of the old rail bed indicates that it will be suitable for a wheelchair trail. It is therefore intended that development and repair of the causeway and the trail, from the parking lot to the eastern end of the conservation area, be designed for handicap use. This trail will be approximately 1800 meters (6000 ft) long. The surface of the trail will be improved and the causeway rebuilt to provide a smooth even surface for wheelchair traffic. A thick layer of stone dust will form the surface and proper erosion control will be established to keep this surface in good repair. The causeway will be rebuilt with a minimum tread width of 2.5 meters (8 ft). The bridge over the culverts will be designed with low level rails and a surface suitable to allow easy passage of 2 wheelchairs. In addition, space will be given to allow a wheelchair or individual to stand and fish in the shallow water under the bridge. Two additional viewing platforms will be built into the wheelchair trail on the causeway. A third platform will be built at the east end of the trail to provide a destination point for the trail and a place to turn wheelchairs around, since they must return on the same trail.

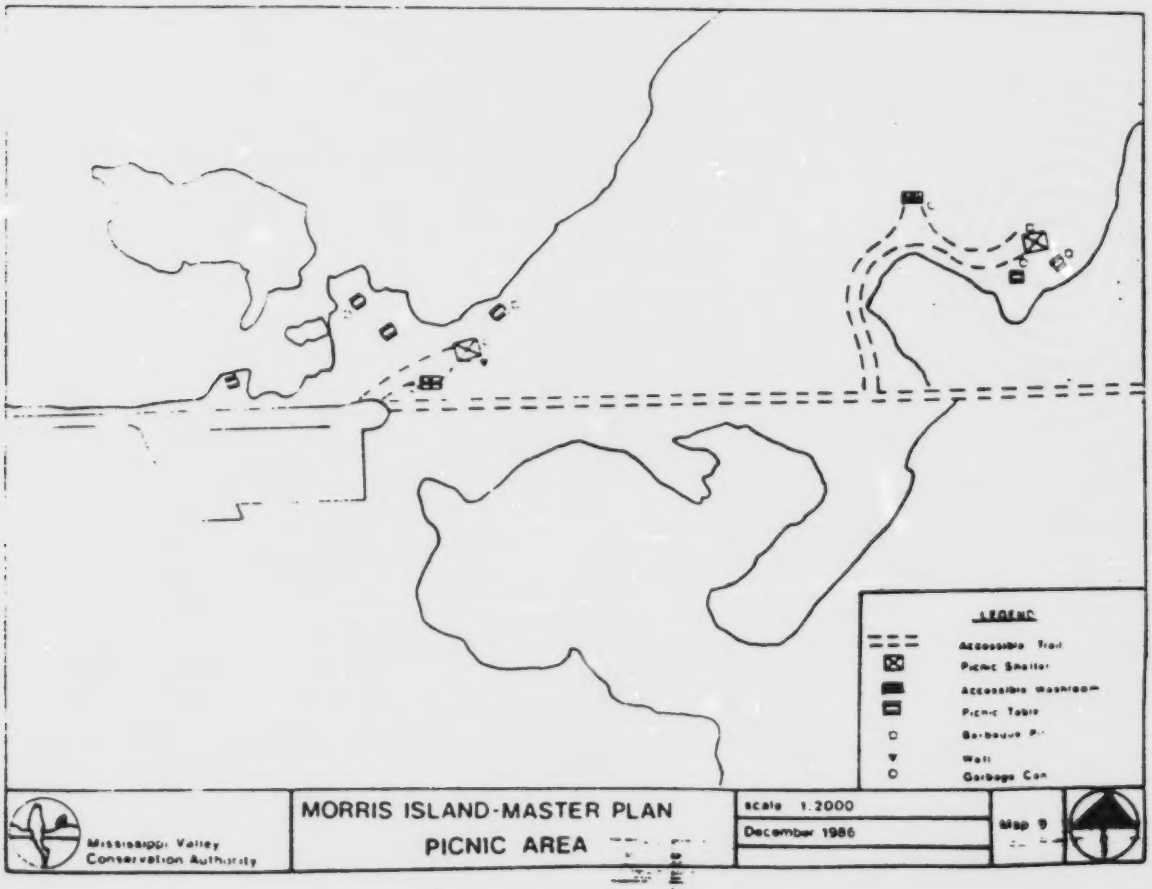
A very short secondary branch of the Accessible trail will be constructed to link the main trail to the picnic area. Construction will be similar to that used on the main trail.

Map 5 & 8 show the location of the Accessible trail, the bridge and the lookout platforms, and appendices 12 to 14 show the designs for the bridge and platforms.

4.3.5 Picnic area

The picnic facilities for this site will be divided into two areas. The first will be near the parking lot. The second area will be only slightly removed from this, on the inner bay. Within the main picnic area there will be approximately four picnic tables of which two will be of the handicapped design. A small picnic shelter will be constructed for the handicap tables. There will be 4 bar-b-que pits, a drinking fountain, and a handicap washroom facility. The path leading from the parking lot to this picnic area, and the washrooms will be of the standard set for the accessible trail, to allow wheelchair access. The second picnic area will be of similar design, however will have only pit privy facilities.


LEGEND
Accessible Trail
Viewing Platform
Barrier Gate
Accessible Washroom
Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
ACCESSIBLE TRAIL LOOKOUT - EAST
scale 1:1000
December 1986
Map 8


LEGEND
Accessible Trail
Picnic Shelter
Accessible Washroom
Picnic Table
Barbeque Pit
Well
Garbage Can
Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
PICNIC AREA
scale 1:2000
December 1986
Map 9

The washroom in the main picnic area will have separate male and female sections. The two main rooms will have one handicap stall each, with flush toilets, and one sink. This development will require a drilled well, holding tank, and electrical service. A service connection and approximately six hydro poles would be needed to bring electricity into the site.

In addition to the main washroom facility there will be male/female washrooms with handicapped dimensions but no water services, located in the second picnic area and at the east end turnaround. Two additional pit-style privies will be located along the trails, at appropriate lookouts or secondary picnic sites. These will be single user facilities. The final location of the washroom facilities will be subject to Ministry of Health approval.

Map 9 provides a site plan for the main picnic areas, and appendices 15 to 22 show the designs for these facilities.

4.3.6 Canoe Launch and Barriers

The beautiful sheltered waters in the inner bay, provide excellent opportunities for water-based recreation and interpretation activities. Unfortunately the waters of the river beyond this bay are considered dangerous due to the proximity to the generating station and it will therefore be necessary to restrict the type and location of these activities. Water-based activities will be restricted to exploring the near-shore aquatic world, fishing from shore, and fishing or exploring in canoes or other small craft in the inner bay only. An access point will be constructed to allow launching of small craft such as canoes or kayaks. In order to ensure that only small craft use the access point, it will be located at a considerable distance from the parking lot thus requiring the user to carry the watercraft to the launch. In order to contain use to the inner bay floating barriers will be installed across the mouth of the bay. These barriers will be in the form of a series of linked booms connected to the shore. Appropriate signs will warn of the dangers of crossing the booms into the dangerous water beyond.

Map 5 shows the location of the launch and the barriers, and appendix 22 shows the designs for these structures.

4.3.7 Trails

4.3.7.1 Hiking and Skiing trails

Trails will be established throughout the area for hiking and skiing. These trails will pass through a variety of natural environments, and where ever possible will follow the shore. They will link special features, and points of scenic beauty. Due to the varied terrain, improvements to the trails will include minor leveling and filling so that the final trail can be safely used by cross country skiers. All trails will be brushed to a width of 2.5 meters (8 ft). Where required foot bridges will be constructed. The bridges will be permanent, and constructed of squared, treated lumber, and capable of withstanding spring flood pressure. In total 7 foot bridges (of varying lengths) will be constructed.

The approximate location of the trails are outlined on Map 5: exact locations will be marked on the ground with flagging tape prior to construction. In addition the bridge locations are marked on the map. Appendix 23 provides the design for the bridges.

4.3.7.2. Interpretive trails

Two of the hiking trails will also be developed as interpretive trails. A post and pamphlet system will be used to highlight the natural features along the trail. The main trail will have two separate themes. The first will emphasize the habitat and wildlife features of the site, and the second will present the history of the site, with specific reference to the railway bridge and the hydro dam, and the river itself, visible from the lookouts.

The second trail will be used to interpret the natural landscape features, geologic structure, forest stands and ground vegetation. Seasonal interpretation will also be pursued on this trail with brochures for hikes such as a spring flowers walk, a mushroom trail in the fall, a tree identification trail in the summer and an animal tracks trail in the winter. Trails in the conservation area will become part of the overall interpretive program which is being developed for all Mississippi Valley Conservation Areas. Each trail will be subject to a yearly review to ensure that the interpretation offered remains relevant and appropriate.

The accessible trail will be used to interpret all of the various themes where possible.

Map 5 shows the approximate locations of the trails.

4.3.8 Trail lookouts and benches

Trail lookouts will be constructed in three locations throughout the conservation area. One will be on the west peninsula looking toward the river and railway bridge, and one looking toward the river and the dam on the east peninsula. The third lookout will be constructed at the east end of the accessible trail. Each lookout will be a small platform, with built in bench seats. They will be strategically placed to offer a scenic vista of the river. In association with each lookout will be a small picnic site consisting of up two or three tables, and a pit toilet.

Trail benches will be provided along all the trails; rustic log benches on the hiking trails and accessible benches along the accessible trail.

Maps 10 & 11 show the locations and appendices 24 & 25 provide the design for the lookouts and benches.

4.3.9 Area signage

Signage in the area will follow the MVCA guidelines used in all conservation areas. The following signs will be installed:

Entrance sign
Area map and Intro. to site
Regulations sign
Interpretive signs
Trail indicators and name signs
Warning signs
Facility signs (ie. washroom)
Area signs (ie. picnic site)
Accessible signs (ie. parking spaces, washroom)

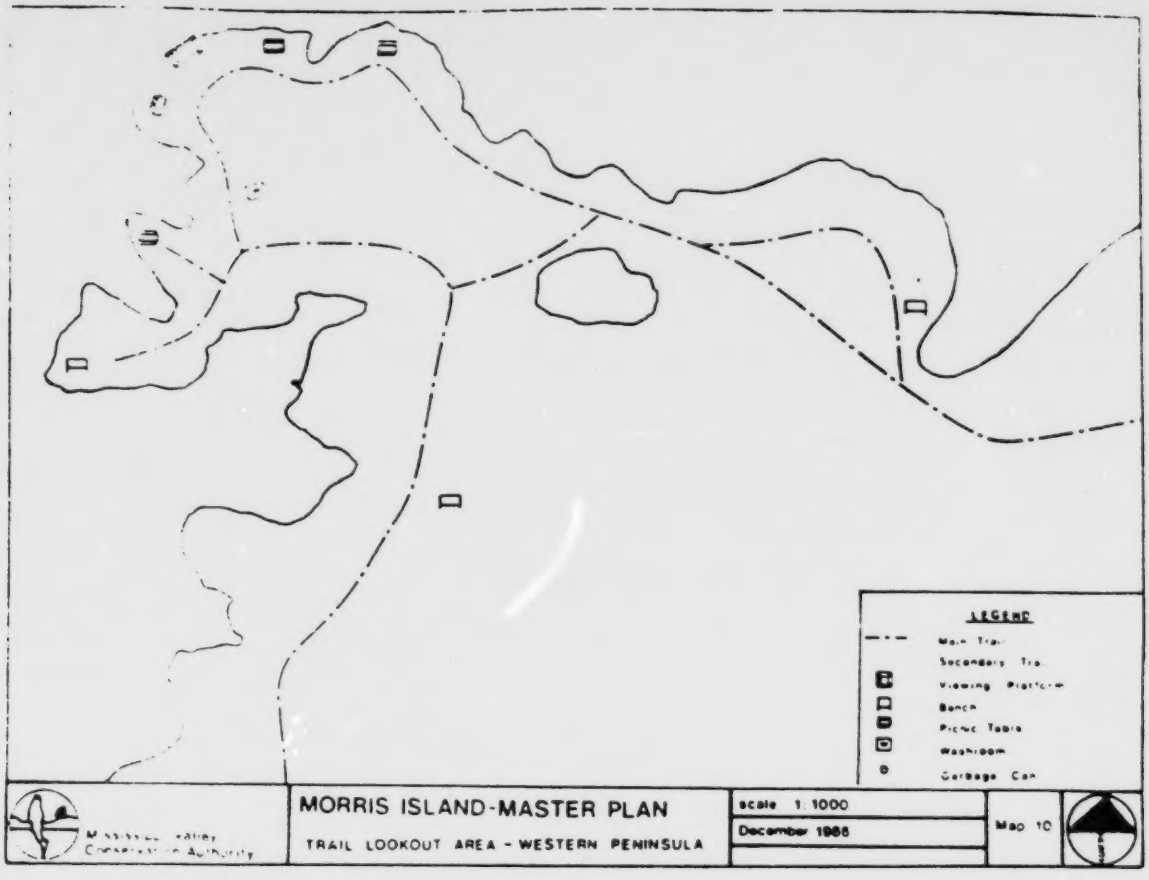
Appendices 27 to 31 provide the designs for these signs.

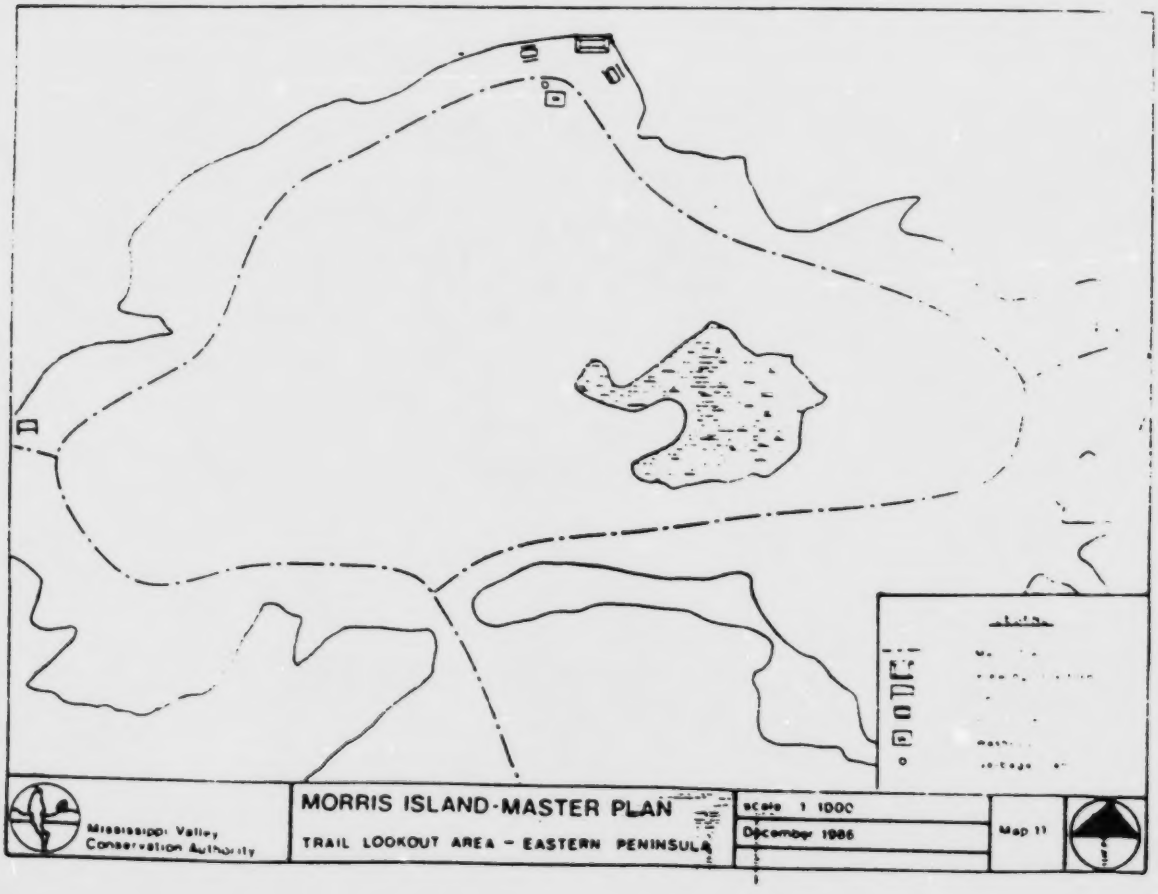
4.3.10 Road signage

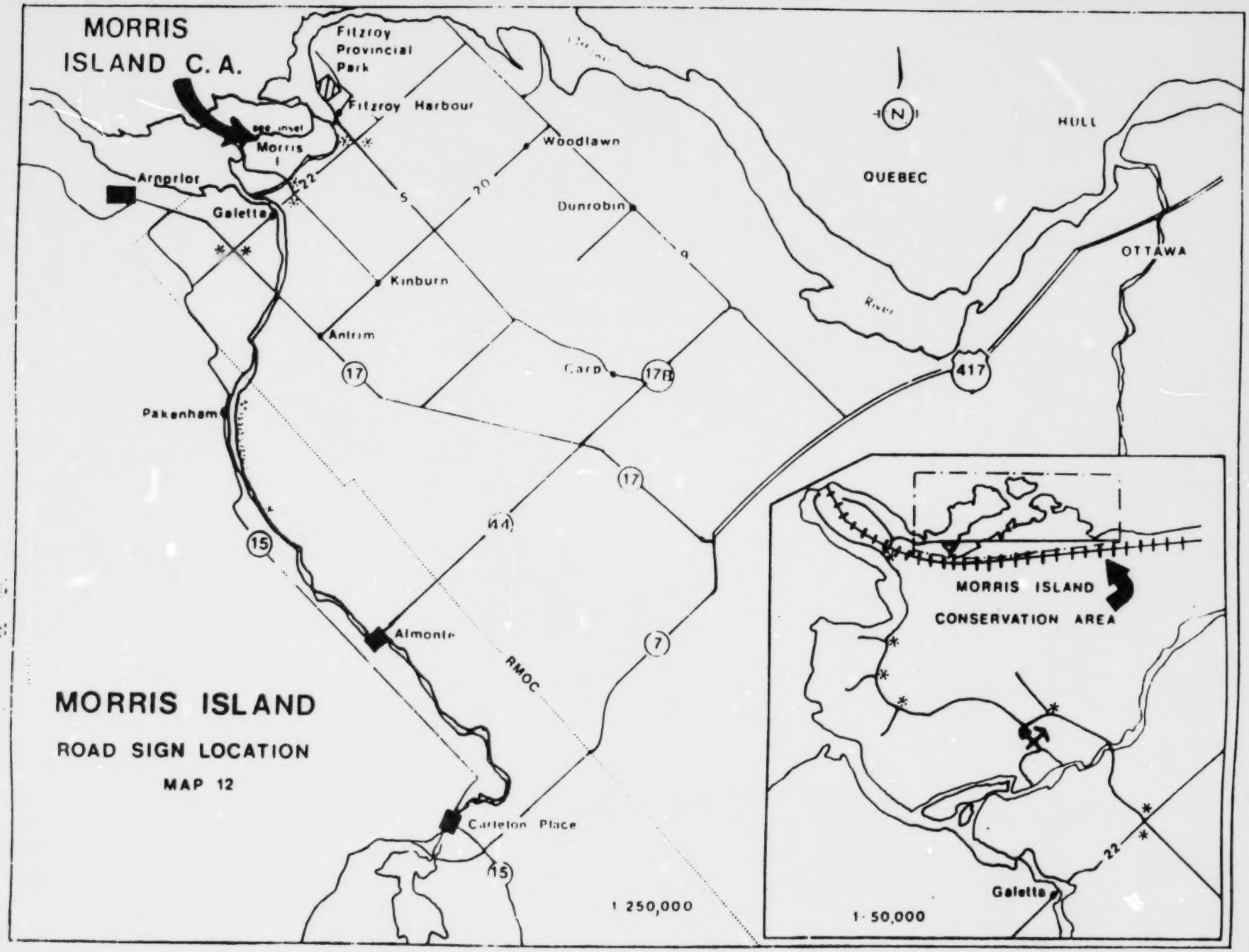
Directional signs will be installed on area roads to direct traffic to the site. These will include:

- MTC signs on Highway 17 at Reg. Rd. 22
- MTC Conservation arrows on Reg. Rd. 22 at, Galetta, Vydon Acres Rd.
- MTC Conservation arrows at 4 turning points on Vydon Acres Rd.
- MVCA Conservation Area signs at intersection of Regional Rd 22 and 5.

Map 12 illustrates the location of the road signs, and appendix 32 provides the design for the MVCA signs.


LEGEND
Main Trail
Secondary Trail
Viewing Platform
Bench
Picnic Table
Washroom
Garbage Can
Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
TRAIL LOOKOUT AREA - WESTERN PENINSULA
scale 1:1000
December 1986
Map 10


Mississippi Valley Conservation Authority
MORRIS ISLAND-MASTER PLAN
TRAIL LOOKOUT AREA - EASTERN PENINSULA
scale 1:1000
December 1986
Map 11


MORRIS
ISLAND C. A.
Fitzroy
Provincial
Park
Fitzroy Harbour
see inset
Morris
Arnprior
Galetta
Woodlawn
Dunrobin
Kinburn
Antrim
Carp
Pakenham
Almonte
Carleton Place
RMOC
HULL
QUEBEC
OTTAWA
River
417
17
17B
44
15
7
22
MORRIS ISLAND
CONSERVATION AREA
Galetta
1 250,000
1 50,000
MORRIS ISLAND
ROAD SIGN LOCATION
MAP 12

4.3.11 Fencing

Due to the sensitive nature of the site and the need to restrict access in times of dangerous water conditions it will be necessary to fence the site. As mentioned previously the entrance fence will span from the active railway to the entrance gate and then to the shoreline. This fence must be in keeping with the natural environment theme of the conservation area and therefore will be constructed of cedar rails. Fencing along the railway track and across the eastern limit of the property will be standard line fencing with cedar posts and page wire. Where the easterly RMOC property boundary crosses the old rail bed a gate will be installed (see map 5). A locking swing gate will be used so that MVCA and Hydro personnel can obtain access to the site for maintenance. This gate will not be located on the dyke nor will it in anyway interfere with Hydro operations. General public access will not be permitted through this gate. At present there is a third access trail to the area, leading from the railway track to the old rail bed. This access will be blocked by the installation of the boundary fence.

Appendices 33 and 34 present the designs for the fence and gate.

5.0 LAND MANAGEMENT

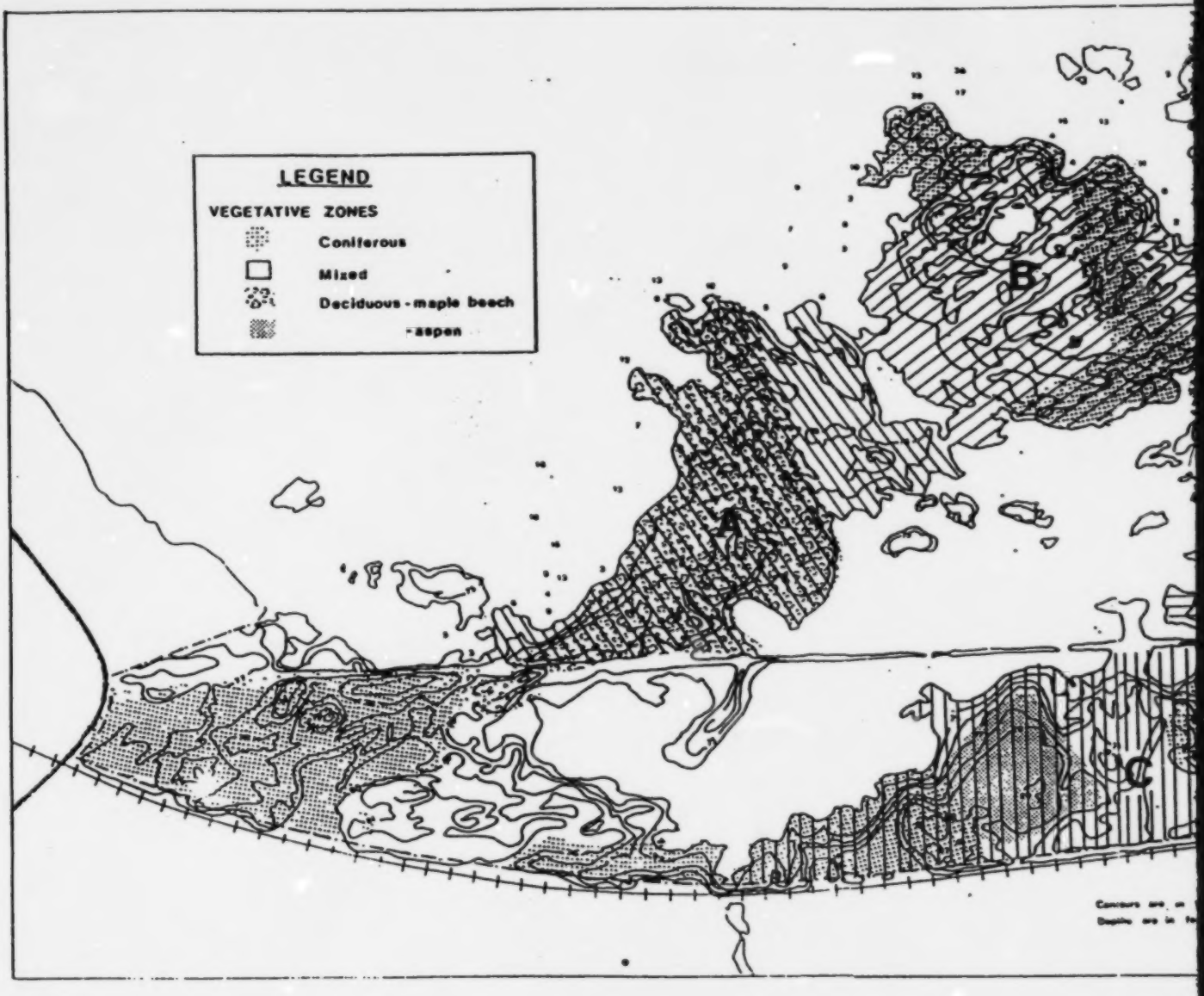
5.1 Forest Management

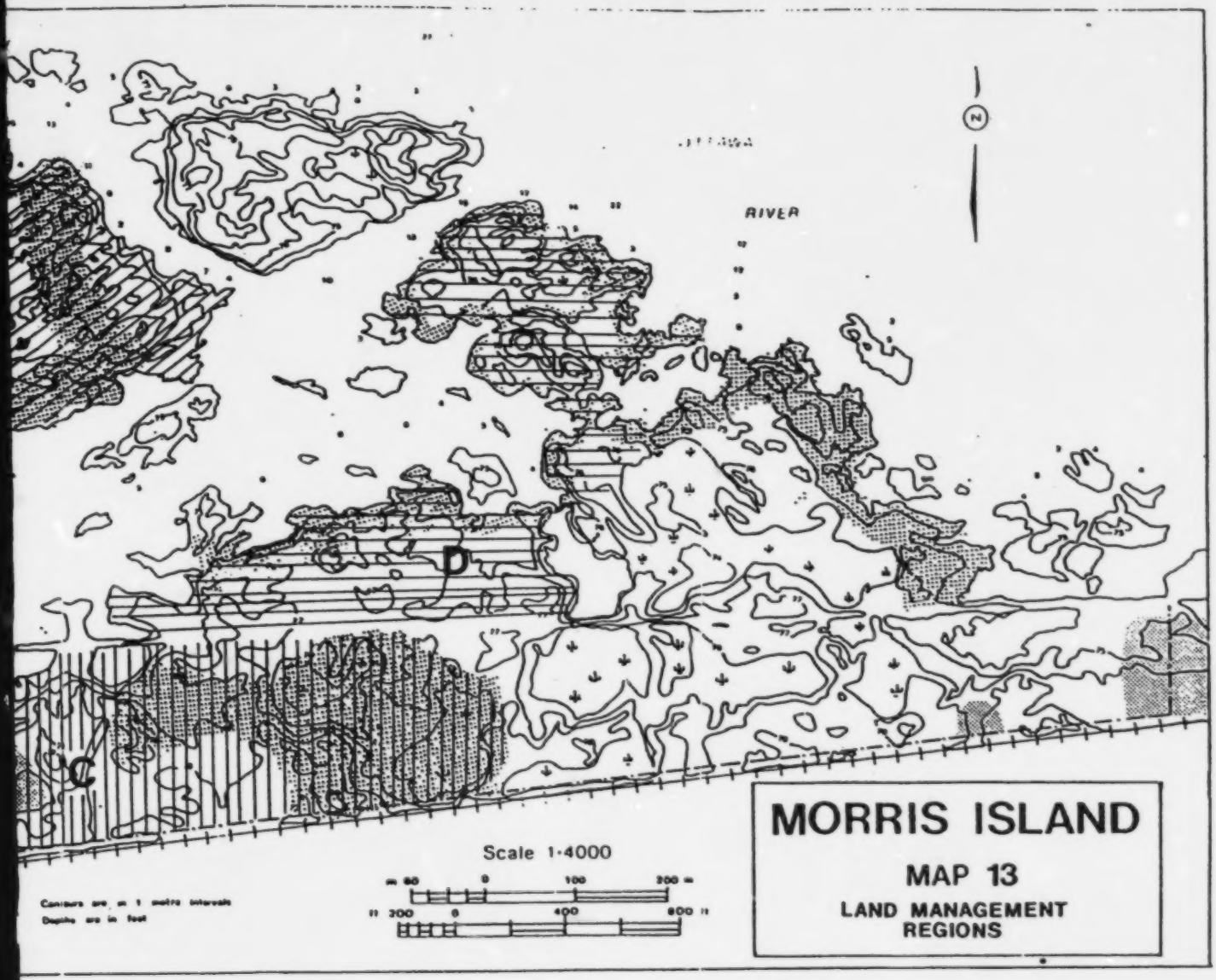
The most prominent vegetative feature of the site is the rich diversified forest. Considerable variation in tree types and age, exists throughout the site, and in general the stands are in good condition. There is however a need to improve the present stand by selectively thinning the canopy and allowing regrowth. Over the past several years a small portion of the forest, in zone A (see map 13), has been thinned and the brush piled. The majority of this brush must now be removed, with a few piles left as wildlife habitat. A similar thinning is necessary in zone B. The remaining areas, C and D, will require selective thinning to a lesser extent, in subsequent years, to maintain overall stand health. The remaining areas, including the sensitive wetlands will be left relatively undisturbed.

The major clean-up and clearing in zones A and B will be part of the initial works and will be completed in the first summer. Future thinnings will be done in the fall and winter, with only emergency cutting during the operating season.

Forestry management will be made a feature in the interpretive program with special stands protected, and unique or significant trees identified. The mature stand of large poplar in zone C will be protected and maintained with an interpretive trail leading through it. Similarly, one of the maple wetland areas will be managed and used in the interpretation program. The picturesque row of white birch on either side of the lane leading to the causeway will be protected and where needed supplemented to produce a "tree lined laneway".

The yearly management activities will become a part of the maintenance schedule for the area and this will ensure that the works will continue after initial site development.


LEGEND
VEGETATIVE ZONES
Coniferous
Mixed
Deciduous - maple beach
- aspen
A
B
C



MORRIS ISLAND

MAP 13

LAND MANAGEMENT REGIONS

5.2 Shoreland Management

One of the most attractive features of the Morris Island Conservation Area is its waterfront. The natural topography of the area is such that this region has an abundancy of small islands and sheltered bays. While this is an asset from the recreational and scenic point of view, it does dictate an increased need for shoreline management. In total, the area has approximately 17,000 meters (55,000 ft) of shoreline.

The fact that the conservation area is located on the forebay of the Ontario Hydro dam, means that there will be considerable fluctuation in the water levels on a daily basis and possible severe flooding in the spring or fall flood seasons. It is not possible to regulate or predict these water levels for recreational uses, or to lessen the impact of the changes on the shore. It will therefore be important to design the facilities to accommodate level fluctuations each day, and to locate facilities where negative impacts from spring flooding will be minimized. At present there are serious erosion problems on several stretches of the shoreline. Of particular concern is the causeway, and this will require immediate correction. Standard erosion control structures have been designed for the causeway, using rip rap for stabilization. Other sensitive areas will be similarly treated as they become evident over the years. New development will be kept away from the immediate shoreland to avoid aggravating or creating erosion problems.

In locations where a particularly attractive scenic vista exists, a viewing platform will be developed. Its design will incorporate features to ensure that its presence will not induce shoreland erosion, and to ensure that the structure is protected from flooding impacts (ie permanent foundations and decking above flood elevation).

In locations were shoreland is moderately eroded, shoreline naturalization erosion control will be utilized. This will be accomplished with the planting of indigenous plant species to stabilize the shoreline soils. If possible a shoreline naturalization demonstration site will be established in the area (preferably on the causeway) to demonstrate the effectiveness of this type of erosion control work. The design of this will not be included in the initial master plan or development works but will be assessed and included in subsequent years when the Authority's water management shoreline restoration program is established and a demonstration site is required.

5.3 Habitat Management for Fish and Wildlife

Vegetation management will be the main technique for attracting more wildlife to the area. The habitat improvements will be directed towards deer, small mammals, waterfowl and other birds.

Initial improvements will include the creation of brush pile shelters, encouragement of deer browse tree species, promotion of aspen suckering for grouse, the placement of nesting boxes for waterfowl, and the installation of an osprey nesting platform.

A detailed habitat management plan will be prepared following a comprehensive site survey and evaluation, conducted in consultation with the Minsitry of Natural Resources.

6.0 MAINTENANCE

Maintenance of this site will require regular inspection and clean-up work during the active months of May to October and periodic inspection during the winter months. Regular clean-up maintenance will include removal of trail debris and garbage, regular cleaning and re-stocking of washroom facilities, and stocking information and interpretation brochure boxes. Minor repairs to facilities, structures and signs will be done as required and major repair works scheduled into the annual work plan when appropriate. Design and construction techniques will adhere to the "maintenance reduction by design" principal instigated for all conservation areas. Annual costs will be the responsibility of the Mississippi Valley Conservation Authority.

Daily or Weekly (May to October)

- open site and washrooms daily (local contract)
- clean washrooms
- replenish supplies - washroom, brochures, comment sheets.
- garbage collection
- site inspection and clear debris
- empty holding tanks as required

Yearly (before opening each spring)

- spring site clean-up - parking lot, picnic areas, trails
- clip vegetation in picnic area
- repair and place picnic tables
- groom trails where needed

Yearly (after fall closing)

- vegetation management
- parking lot grading
- selective trail brushing
- inspect and change interpretive material
- maintenance of erosion control works
- snow plough lane and parking lot as needed

Five Year Rotational Maintenance

- repaint facilities - signs, washrooms, tables
- resurface trails - stone dust or wood chips where appropriate
- major woodlot thinning
- fence repairs

Average Annual Maintenance Costs $5,000

7.0 IMPLEMENTATION

7.1 DEVELOPMENT AND COSTING

ITEM		
1. Entrance		
- level and gravel entrance lane	1000	
- clear fence line	100	
- landscape	100	
- gate	800	
- fence	100	
		2,100
2. Lane and parking lot		
- level and gravel	500	
- build two pull-offs	2000	
- clear trees from lot	500	
- blast and bulldoze lot	2000	
- place gravel	5000	
- ditch lane and lot where needed	500	
- parking slot barriers	350	
- bollards	150	
		11,000
3. Causeway		
- subgrade preparation	4000	
- supply and place fill	20000	
- erosion protection	10000	
- install culverts	10000	
- construct walkway	6000	
- contingency	10000	
		60,000
4. Accessible trail		
- level railbed	400	
- fill in eroded areas	1000	
- top with stone dust, grade	8000	
- clear and level 3 bench areas	300	
- platform foundations	200	
- 3 lookout platforms on trail	1200	
- 3 accessible trail benches	150	
- accessible trail bridge	3000	
- guard rail on causeway section	2000	
- double pit privy	1500	
		17,750

5. Picnic Area 1		
- selectively thin trees	200	
- bulldoze entrance to area	500	
- clear and level trail to washroom and shelter (20 m)	500	
- stone dust trail & accessible picnic table pads under picnic shelter	800	
- drill well	1000	
- dig pit and construct holding tank	1500	
- construct washroom facilities and install plumbing, electricity	8000	
- install hydro poles (6)	3000	
- hydro connection	400	
- drinking fountain	800	
- shelter	1500	
- picnic tables (2 each design)	500	
- B-B-Q pits (4)	400	
- garbage bins (2)	100	
		19,200
6. Picnic Area 2		
- selectively thin trees	100	
- dig pit for double privy	100	
- level trail and shelter pad (1000m)	800	
- shelter	1500	
- double pit privy	1500	
- picnic tables (2 each design)	500	
- B-B-Q pits (4)	400	
- garbage bins (2)	100	
		5,000
7. Canoe launch and barriers		
- level slope and add gravel	400	
- construct or buy hydro log booms		
- 4 tie-down stakes for floating barriers	50	
- log booms and chain (25)	2000	
		2,450
8. Trails		
- brush trail (2.5m width, 10km)	4000	
- level & fill where needed	4000	
- woodchip trail where needed		
- make & install interp. signs	500	
- make & install ski blazes	200	
- trail bridges (7)	4200	
- trail benches (10)	300	
		13,200
9. Trail Lookouts (east and west peninsula)		
- selectively thin trees	100	
- trim under story		
- platform foundations	300	
- platform (2)	2000	
- picnic tables (6)	600	
- pit washrooms (2)	1000	
		4,000

10. Signs
- entrance sign
- regulation sign
- area map
- intro. to site, brochure, comment
- interp bulletin board
- 4 - directional to picnic area
- 2 - washroom
- 2 - boat launch
- 4 - dangerous water beyond
- 100 - trail blazes
- 20 - tree tags
- 20 - interp signs
- 15 - numbered posts
- 5 - outhouse arrows (trail lookouts)
- 4 - park boundary
- 1 - hours of operation (on gate)
- 1 - Closed Due to Hazardous Conditions

	2000	
		2,000

11. Road Signs

- 2 - G84 MTC on Hwy. 17		
- 3 - M33 MTC on Cty Rd. 22		
- 3 - M25B MTC on Cty Rd. 22	2500	
- 4 - M33 MVCA on Vydon Acres Rd.	100	
- 2 - MVCA at Cty. Rd. 22 & 5	200	
		2,800

12. Fencing

- repair fence along railway	300	
- Cedar rail fence 50 meters	500	
- page wire line fence 320 meters	1500	
- swinging wire gate with lock (1 lane)	200	
		2,500

Total Estimated Cost	$142,000
plus contingency	20,000
less Special Employment	42,000
Total Cost	120,000

Note: The Mississippi Valley Conservation Authority traditionally relies heavily on special employment programs to provide the labour for construction projects such as this. The above budget assumes that a major special employment program will provide a crew of 10 persons for 12 weeks plus expense money. If however this is not the case, the final construction budget may be increased to $162,000.

7.2 SCHEDULE AND FUNDING

Development of the Morris Island Conservation Area will be highly dependent on the Mississippi Valley Conservation Authority, Regional Municipality of Ottawa - Carleton, and Ministry of Natural Resources budget approval processes, and special fund raising efforts.

The following provides a tentative schedule for the works presuming that preliminary budget projections and assumptions continue to be applicable.

Expenses	1988 $	1989 $	Total $
Entrance	2,100		
Lane & Parking Lot	11,000		
Fences	2,500		
Causeway	60,000		
Road Signs	2,800		
C.A. Signs	2,000		
Picnic Services	8,150		
Picnic Facilities		16,050	
Barriers	2,450		
Trails - Accessible		17,750	
- Ski		1,200	
- Hiking		12,000	
Lookouts		4,000	
Contingencies (labour)	17,000	3,000	
Total	108,000	54,000	162,000
Funding			
MVCA	54,000	27,000	81,000
RMOC	54,000	27,000	81,000
Total	108,000	54,000	162,000

Appendix 1: Vegetation Inventory - Wildflowers

SOAPWORT
BUSHY ASTER
BLUESTEM GOLDENROD
CLOSED GENTIAN
COMMON PLANTAIN
SPOTTED JOE-PYE WEED
RAGWEED
SPINY-LEAVED SOW THISTLE
CANADA GOLDENROD
QUEEN ANNE'S LACE
POISON IVY
MILKWEED
CLIMBING BITTERSWEET
PURPLE LOOSESTRIFE
COMMON MULLEIN
CROWN VETCH
TURTLE HEAD
COMMON STRAWBERRY
SPOTTED TOUCH-ME-NOT
BUTTER AND EGGS
COMMON ST. JOHN'S WORT
LANCE-LEAVED GOLDENROD
LADY'S THUMB
OXEYE DAISY
SILVER ROD
RED TOP
HEDGE BINDWEED
VIPER'S BUGLOSS
SNEEZEWEED
BLADDER CAMPION
BURDOCK
STIFF ASTER
LARGE LEAVED ASTER
TRILLIUM
SWAMP GRASS
GIANT REED
SENSITIVE FERN
GROUND PINE
LOBE LEAVED HELPATICA
INDIAN PIPE
PICKEREL WEED
LABODOR TEA
WATER TAPE GRASS
RIVERBANK GRAPE
BUR CUCUMBER
CANADA DWARF CINQUEFOIL
WHITE BANEBERRY
FALSE SOLOMON'S SEAL
SOLOMON'S SEAL
NORTHERN BEDSTRAW
ORCHID
HELLEBORNE
LADY FERN
MAIDENHAIR FERN
MUSHROOMS
PUFF BALL
MINT
RED BANEBERRY
WHITE SNAKEROOT
SNAKE GRASS
MOSS
SHINLEAF
GOLDEN ROD
SPRUCE MOSS
ROSE TWISTED STOCK
BLACK SNAKE ROOT
BRACKEN FERN
WILD ROSE
BLEEDING HEART
CLUB MOSS
CANADA MAYFLOWER
WHITE WOOD ASTER
GRAPE FERN
FLAT TOPPED WHITE ASTER
CATTAIL
BEECHDROP
COMMON MOONSEED
TWINFLOWER
IRIS
HONEYSUCKLE
HOG PEANUT
PURPLE FLOWERING RASPBERRY
LOPSEED
POLYPOD
YELLOW LADY SLIPPER
CLOVER
ROUND LEAVED ORCHIS
THIMBLEWEED
MORNING GLORY
HAWTHORNE
SEDGES

Appendix 1 : Vegetation Inventory - Trees

BALSAM POPLAR
SUGAR MAPLE
BIRCH
WHITE ASH
RED OAK
WHITE ELM
BALSAM FIR
BEECH
STRIPED MAPLE
SILVER MAPLE
STAGHORN SUMAC
WHITE PINE
JUNIPER
WHITE SPRUCE
WHITE CEDAR
BLUE BEECH
SPECKLED ALDER
BITTERNUT HICKORY
BASSWOOD
WHITE OAK
BUR OAK
ROUND LEAVED DOGWOOD
ALTERNATE LEAVED DOGWOOD
LARGE TOOTHED ASPEN
TREMBLING ASPEN
WILLOW
HOP HORNBEAM (IRONWOOD)

Appendix 2 : Wildlife Inventory

BIRDS

GREAT BLUE HERON
PILEATED WOODPECKER
CHICKADEES
SPARROWS
BLUEJAY
GULL
RED-WINGED BLACKBIRD
ROBIN
CANADA GOOSE
CROW
BLACK DUCK

ANIMALS

CHIPMUNK
RACCOON
SQUIRREL
PORCUPINE
WHITE TAILED DEER
BEAVER
MUSKRAT

GARTER SNAKE
NORTHERN WATER SNAKE
SMOOTH GRASS SNAKE
LEOPARD FROG
BULLFROG

Appendix 3 : Interpretive Features

GEOLOGICAL

G1 - sink holes
G2 - lichen on rock (soil formation)
G3 - ravine - erratic or man-made
G4 - sink hole
G5 - bedrock outcrop - part of riverbed
G6 - large water-filled sink hole
G7 - poor soil - fallen tree
G8 - rock outcrop
G9 - natural sand beach
G10- coloured marble
G11- rock outcrop moss covered
G12- large marble outcrop

HISTORICAL

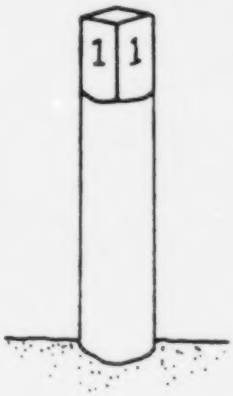
H1 - steel cable and hook (hydro)
H2 - pail (maple syrup production)
H3 - survey swath
H4 - old railway tie

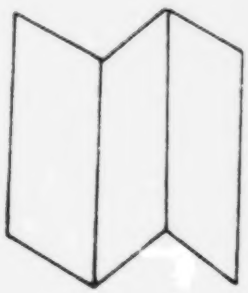
FLORAL

F1 - birch stand
F2 - maple-beech area
F3 - maple-beech mature forest - forest succession
F4 - fallen trees
F5 - cedar-fir stand
F6 - evidence of burn - younger trees
F7 - diverse wildflowers along causeway
F8 - cedar stand
F9 - large toothed aspen - forest succession
F10- mushroom community
F11- open space, little vegetative growth
F12- tree stands in swamp - silver maple (1 of few)
F13- fallen tree - poor soil

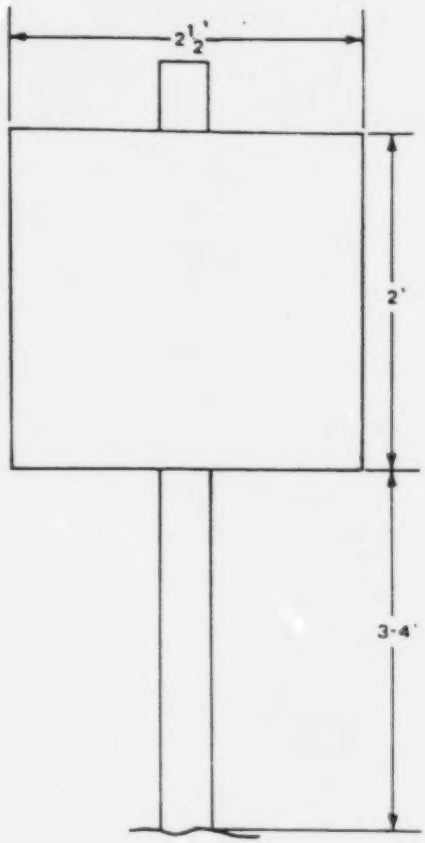
ANIMAL

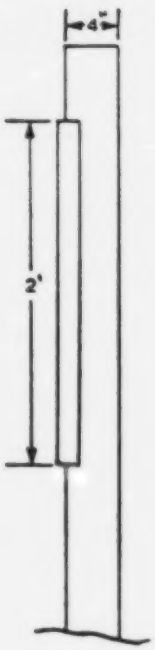
A1 - porcupine evidence
A2 - woodpecker hole tree
A3 - nest in tree
A4 - animal trap
A5 - deer evidence
A6 - beaver dam
A7 - beaver house
A8 - animal burrow
A9 - clam shells - feeding area
A10- good fishing
A11 - deer yard
A12 - beaver dam
A13 - animal burrow
A14 - wood duck nesting box
A15 - beaver house



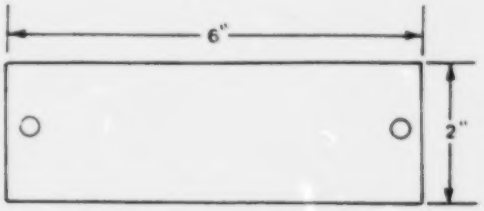


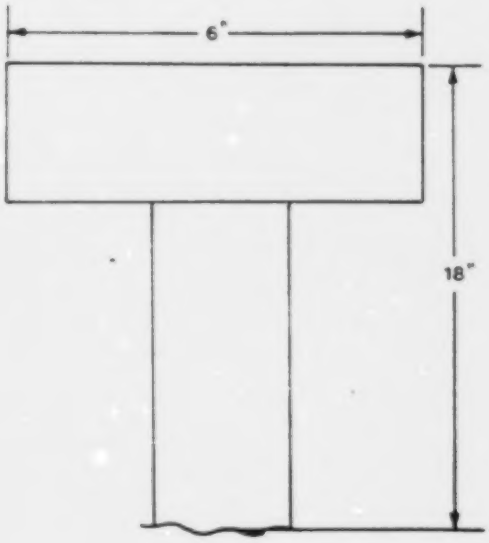
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 4. Post and Pamphlet
MORRIS ISLAND CONSERVATION AREA	M.D.





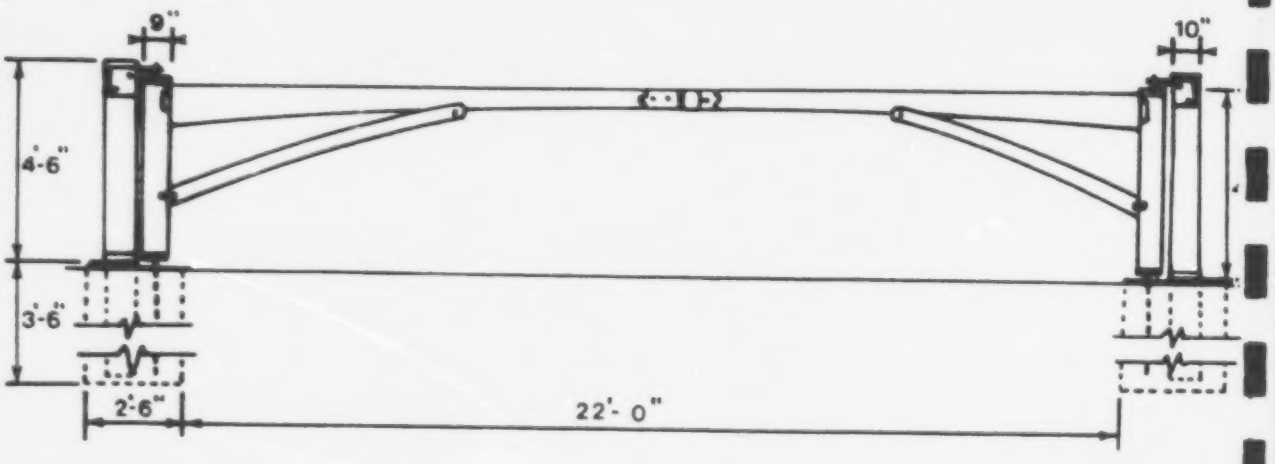
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 5. Information Signs
MORRIS ISLAND CONSERVATION AREA	M.D.





MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 6. Feature Labels	
MORRIS ISLAND CONSERVATION AREA		M.D.

FRONT



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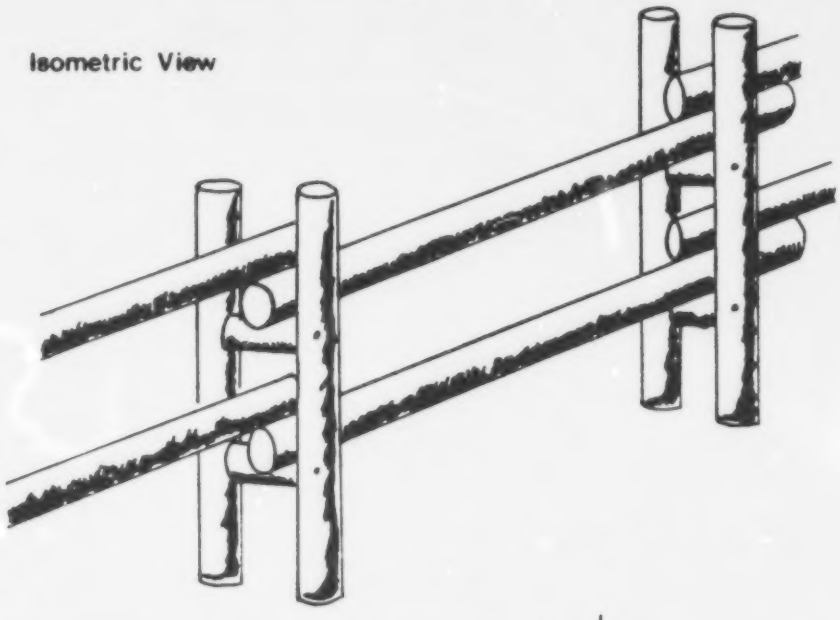
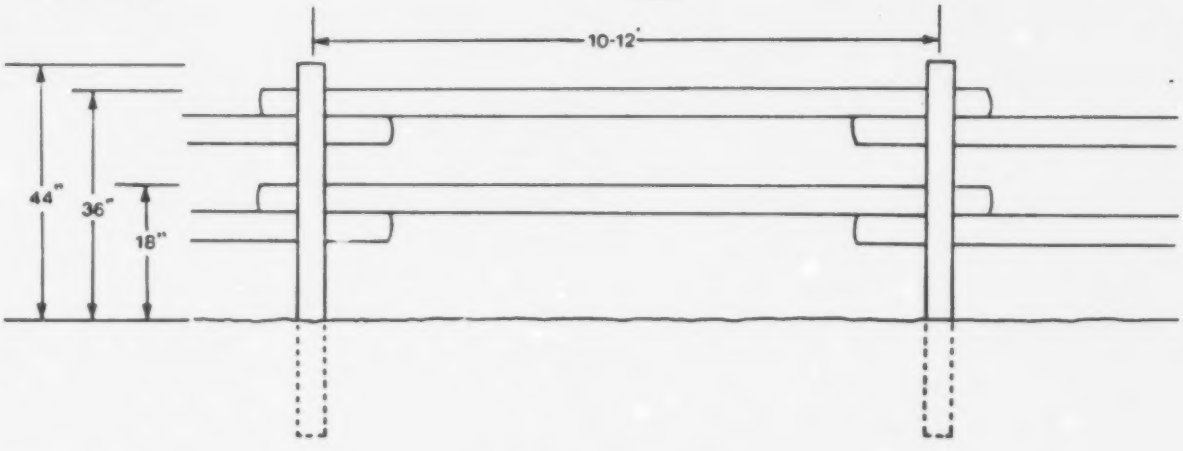
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 7. Entrance Gate
MORRIS ISLAND CONSERVATION AREA	M.D.

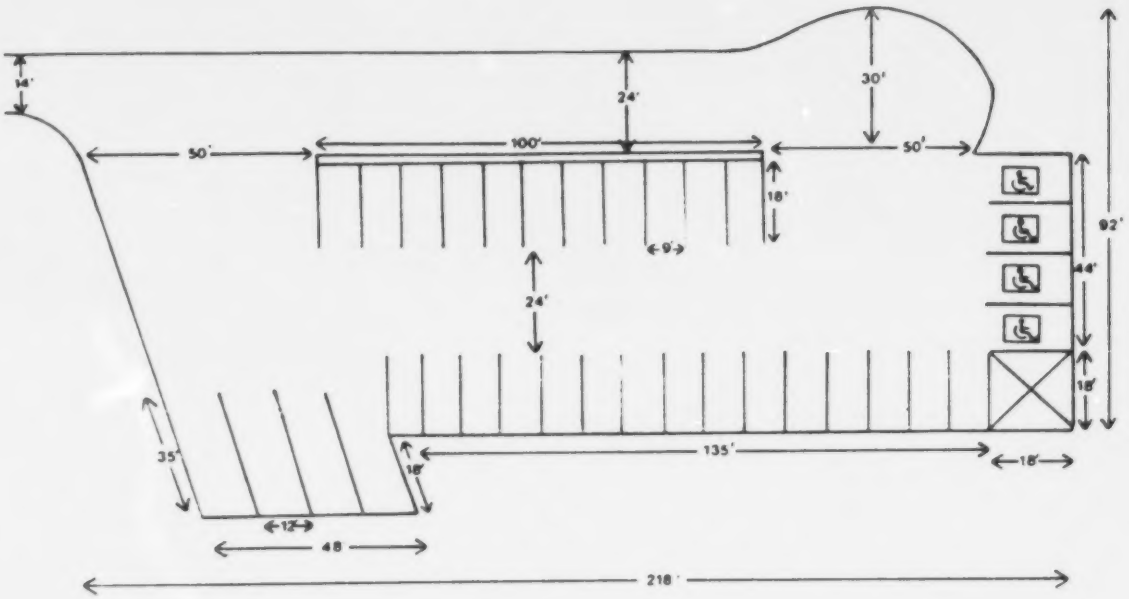
Isometric View



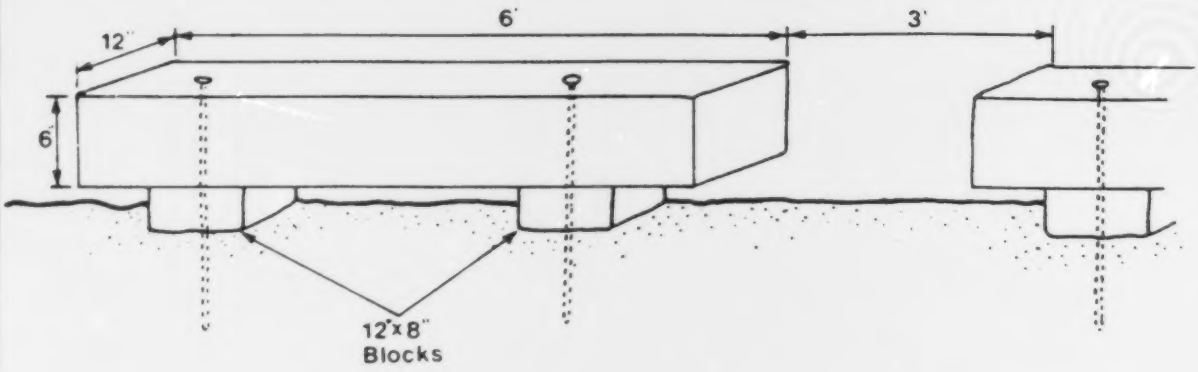
Side View

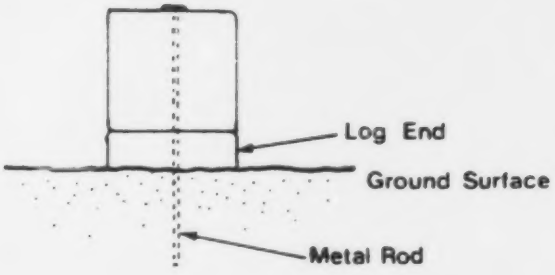


MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 8. Entrance Fence	
MORRIS ISLAND CONSERVATION AREA		M.D.

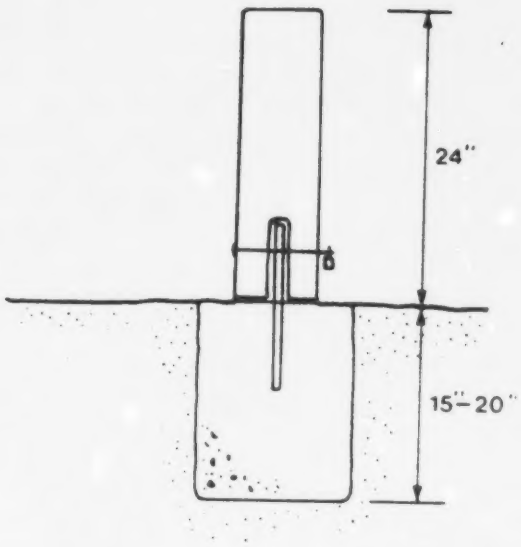


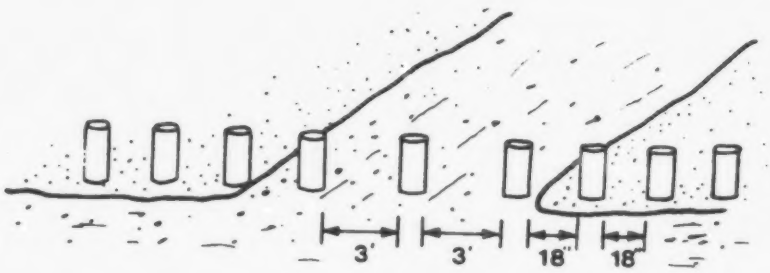
MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 9. Parking Lot	
MORRIS ISLAND CONSERVATION AREA		M.D.



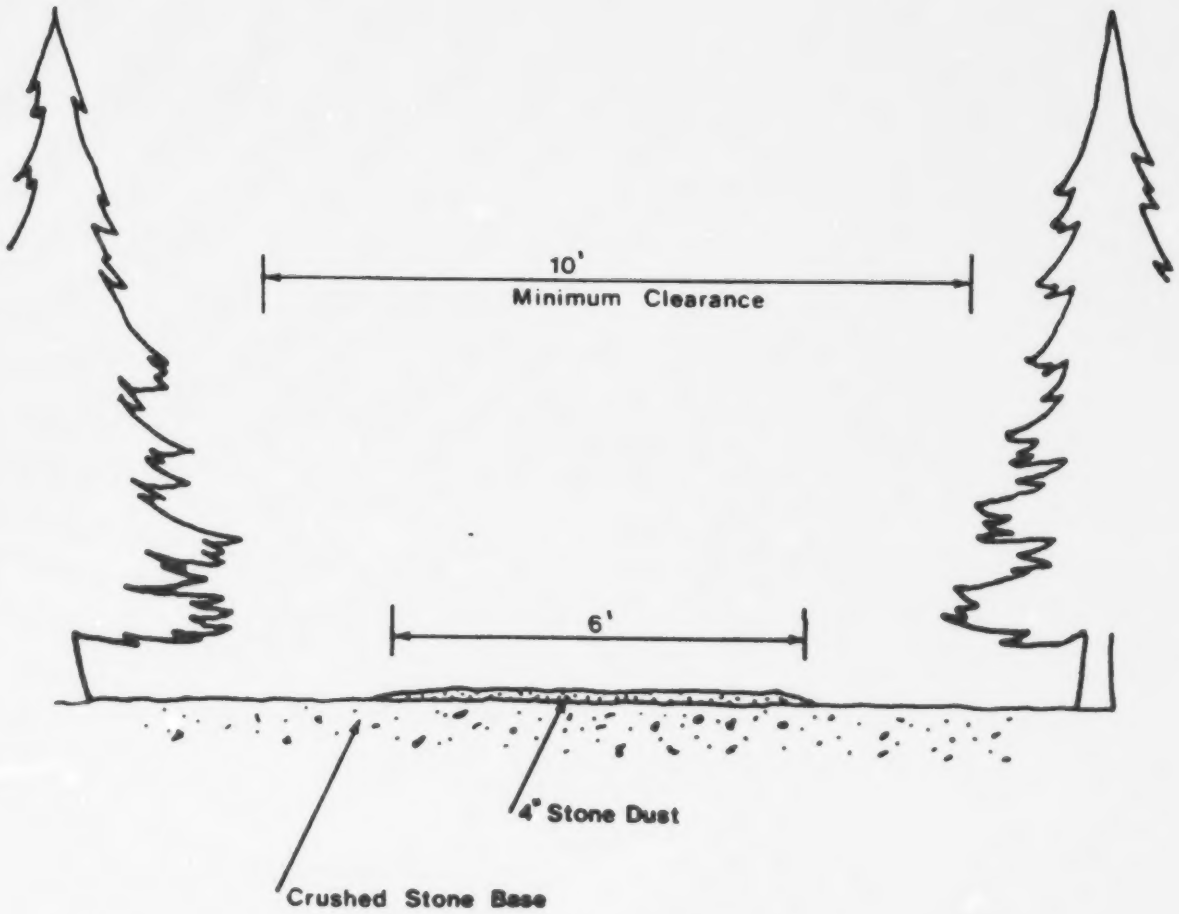


MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 10. Parking Barrier	
MORRIS ISLAND CONSERVATION AREA		M.D.





MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 11. Bollards
MORRIS ISLAND CONSERVATION AREA	M.D



MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 12. Accessible Trail	
MORRIS ISLAND CONSERVATION AREA		M.D.

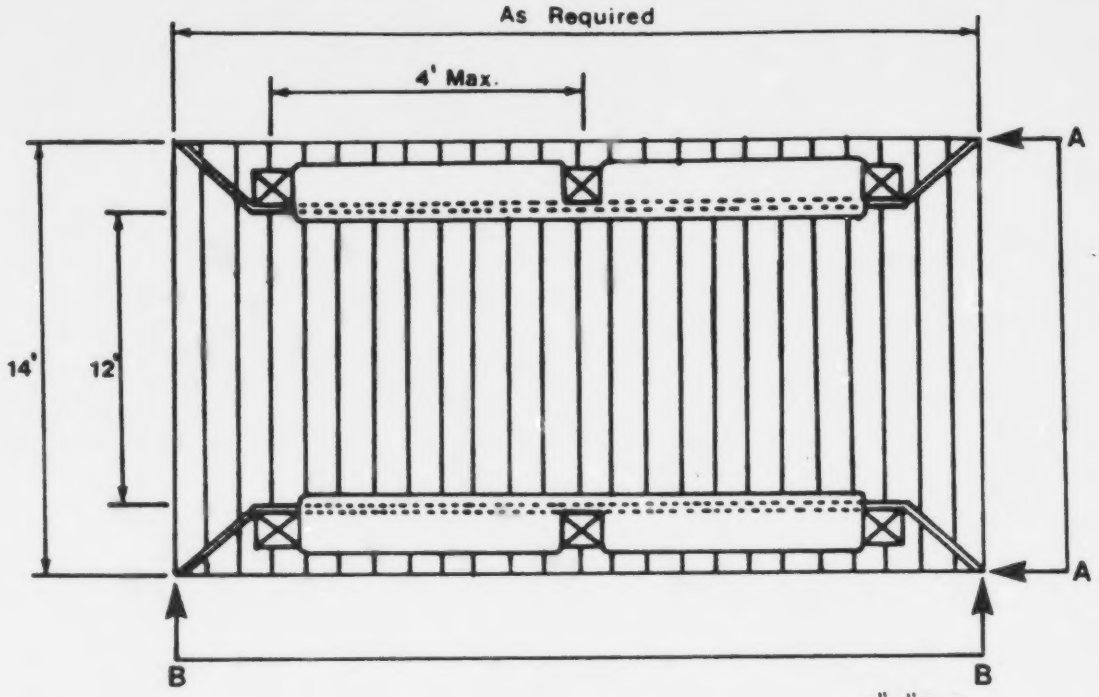


Figure B-B

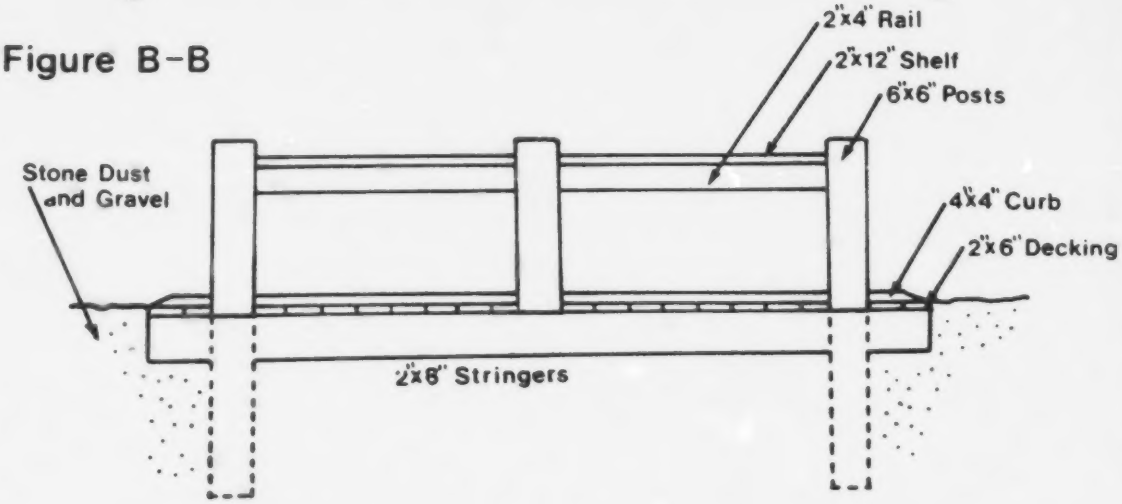
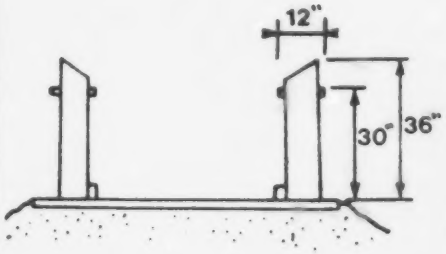
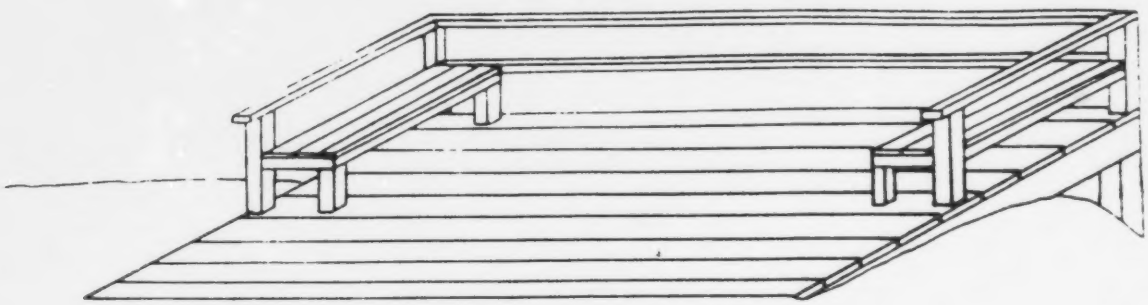


Figure A-A

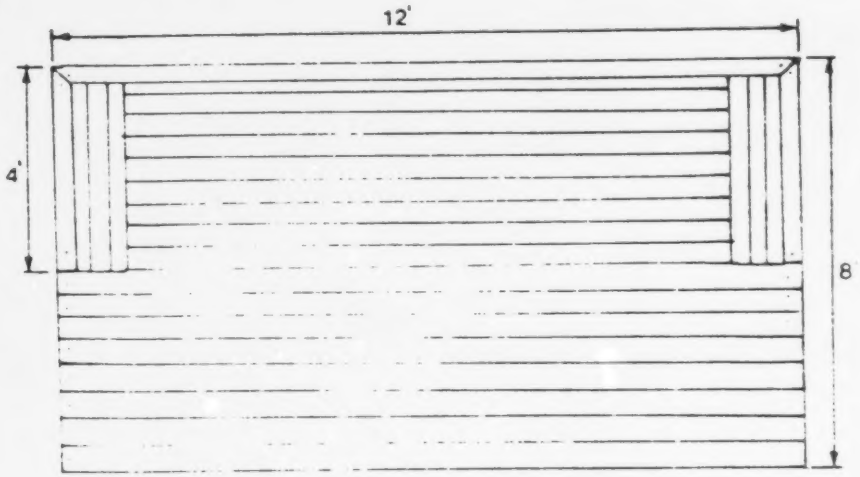


MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 13. Accessible Trail Bridge
MORRIS ISLAND CONSERVATION AREA	M.D.

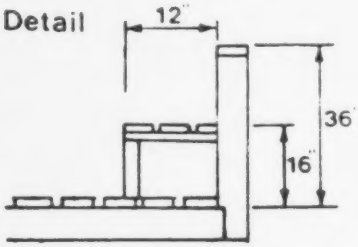
Isometric



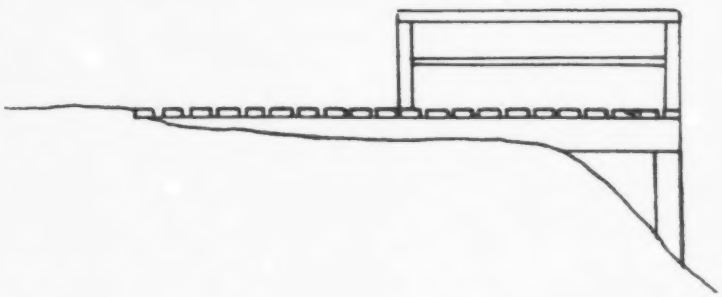
Top



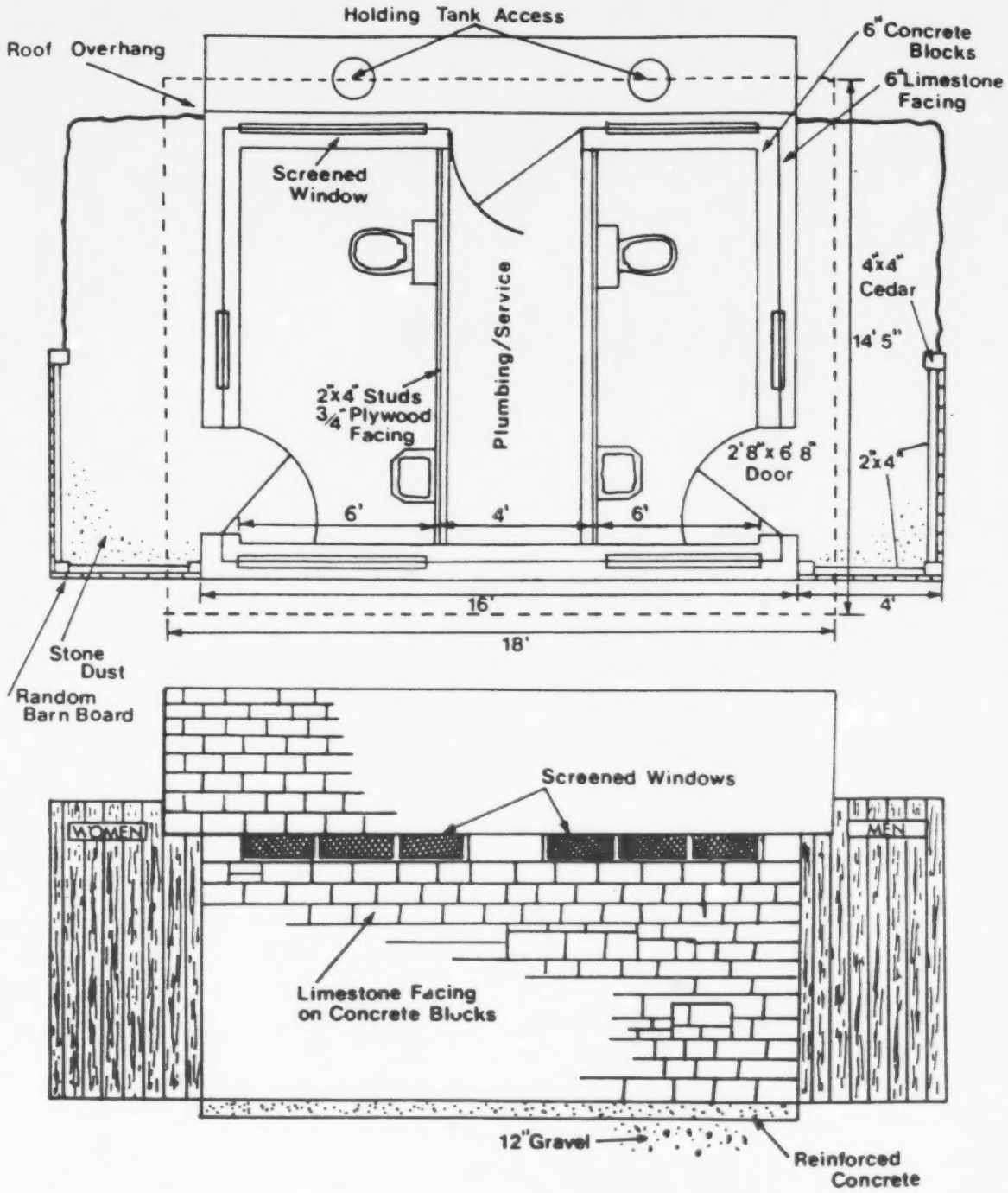
Detail



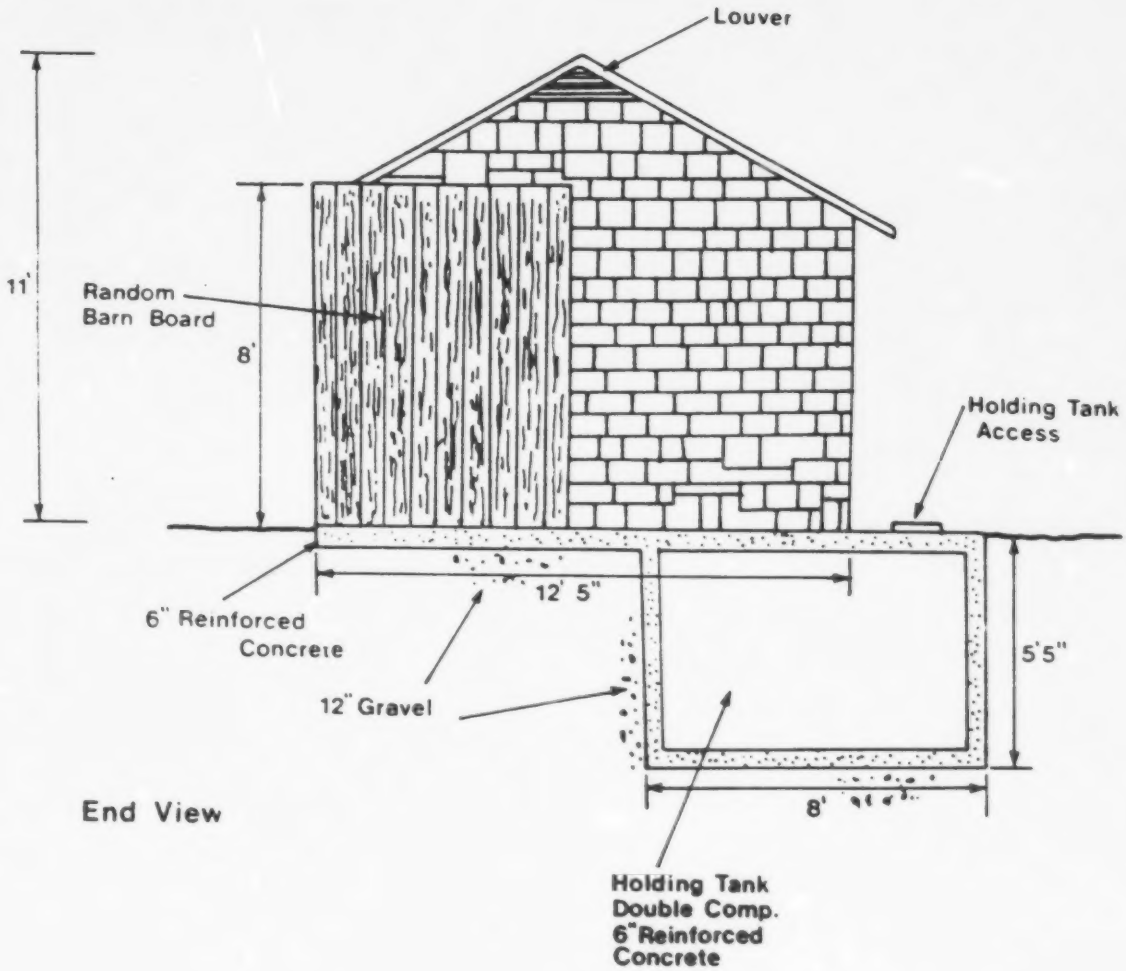
Side



MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 14. Accessible Trail Lookout Platform
MORRIS ISLAND CONSERVATION AREA	M.D.



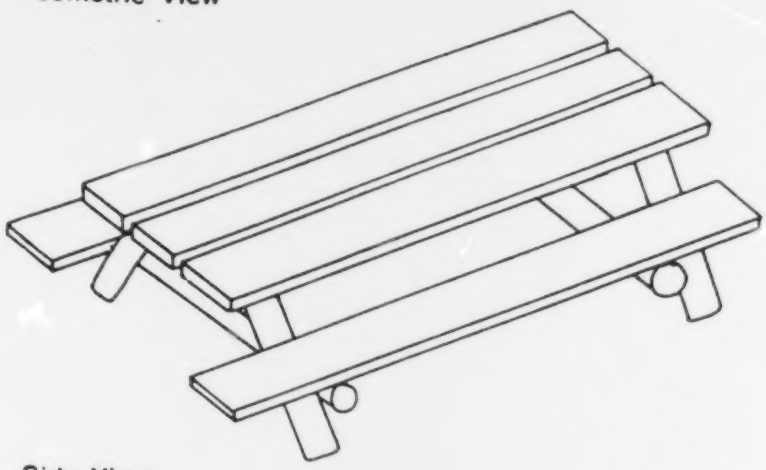
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 15. Accessible Washroom
MORRIS ISLAND CONSERVATION AREA	M.D.



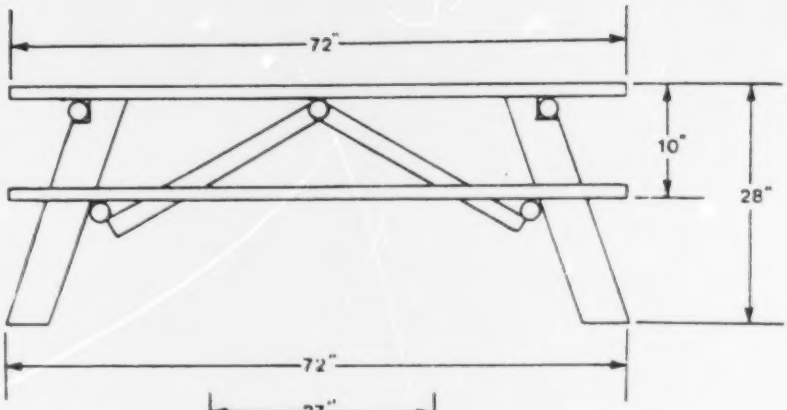
End View

MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 15. Accessible Washroom
MORRIS ISLAND CONSERVATION AREA	M.D.

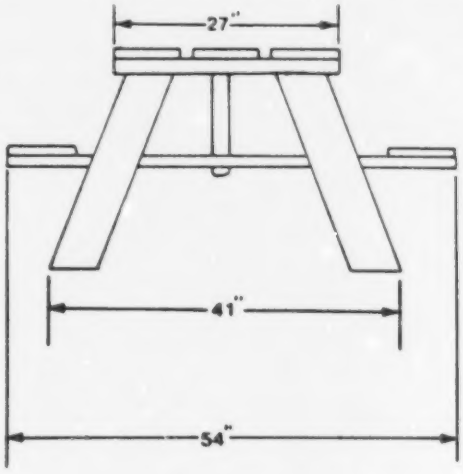
Isometric View



Side View

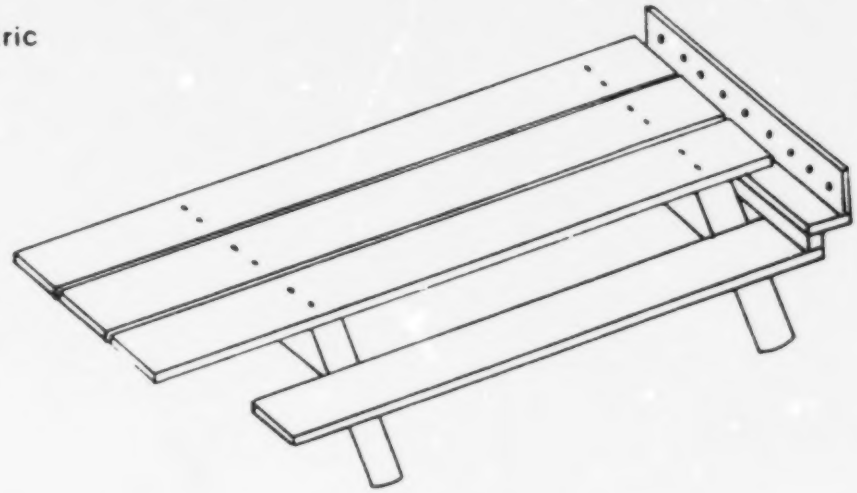


End View

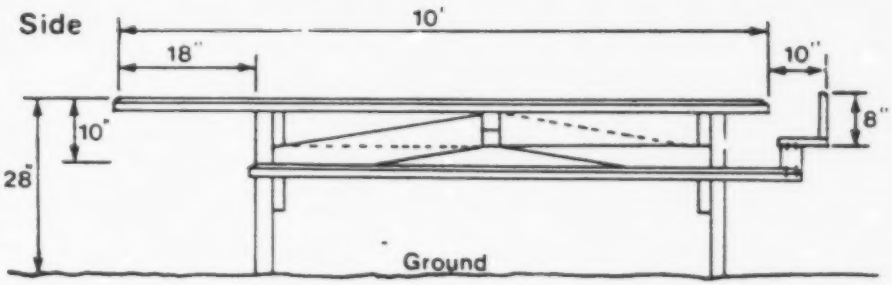


MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 16. Standard Picnic Table
MORRIS ISLAND CONSERVATION AREA	M.D.

Isometric



Side



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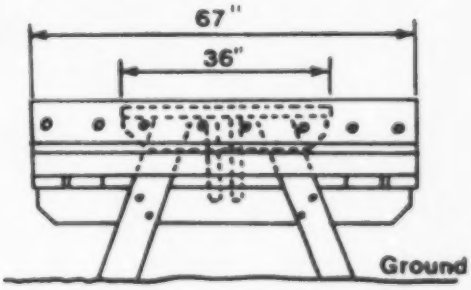
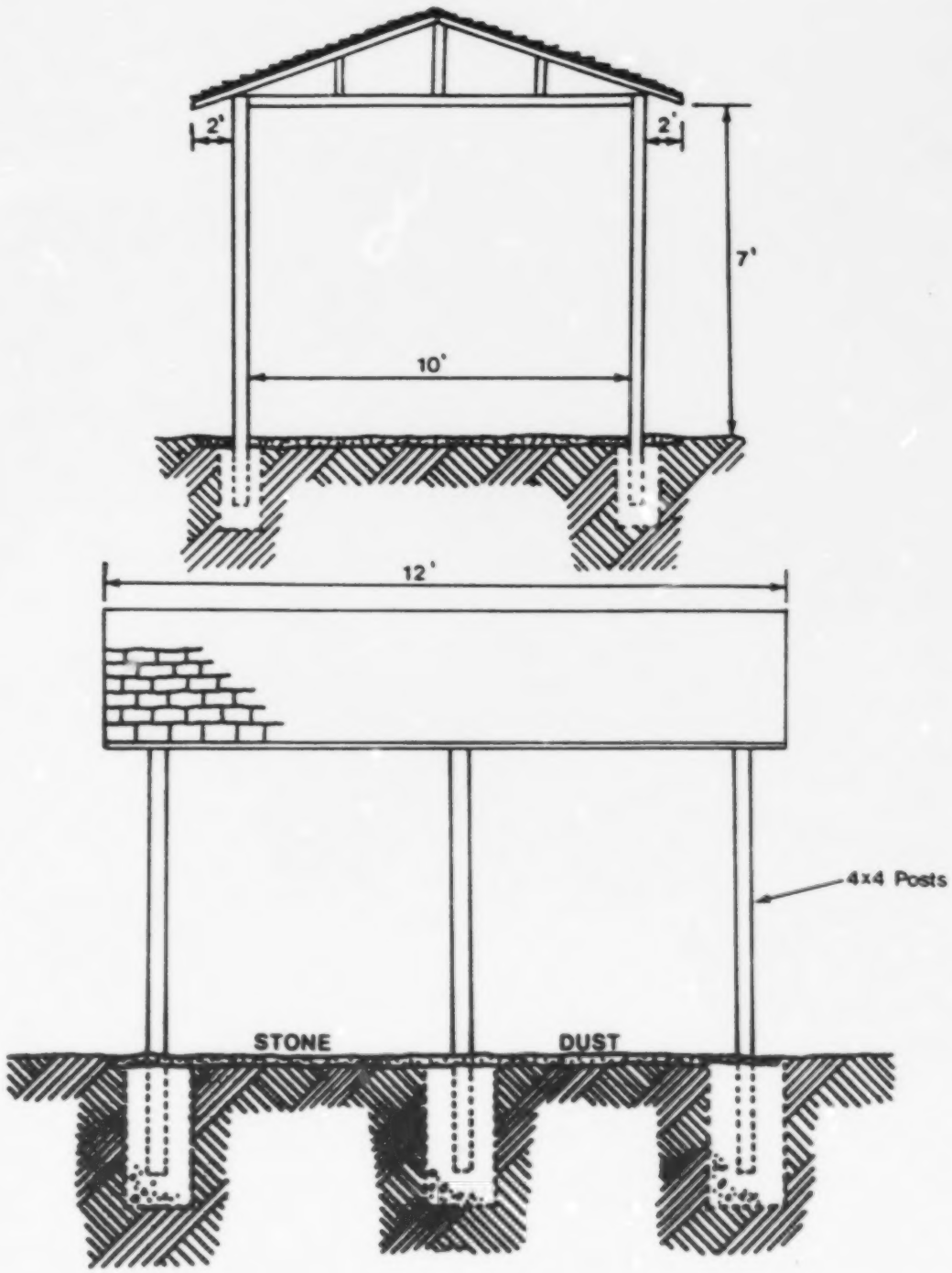
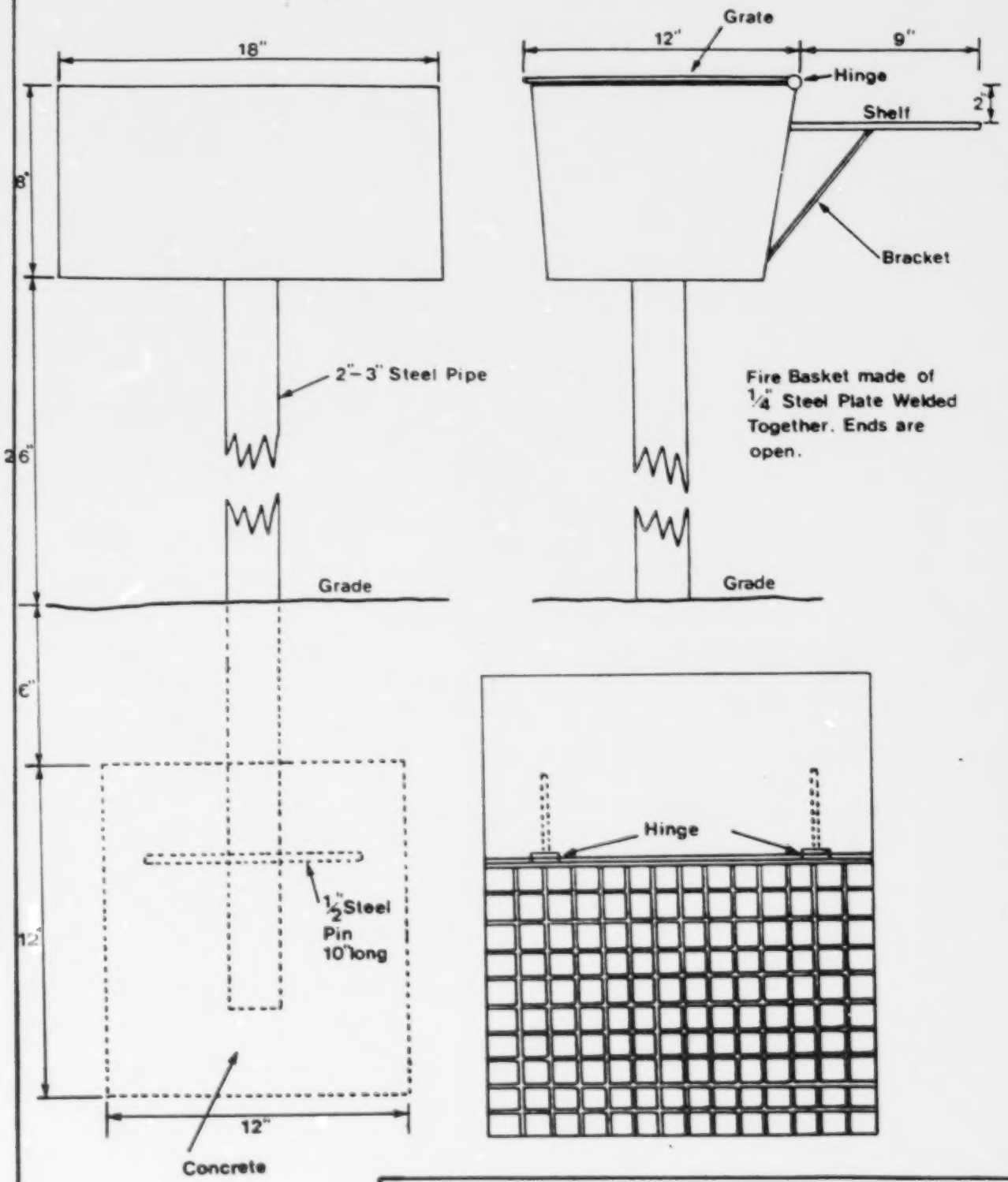


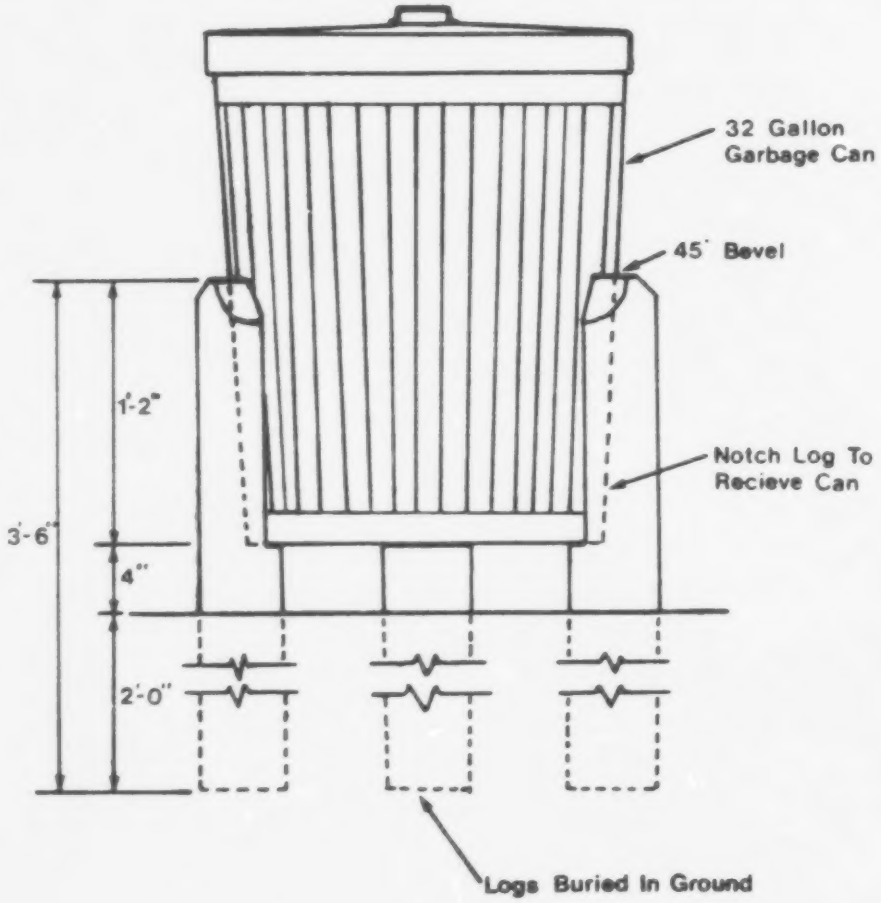
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 17. Accessible Picnic Table
MORRIS ISLAND CONSERVATION AREA	M.D.



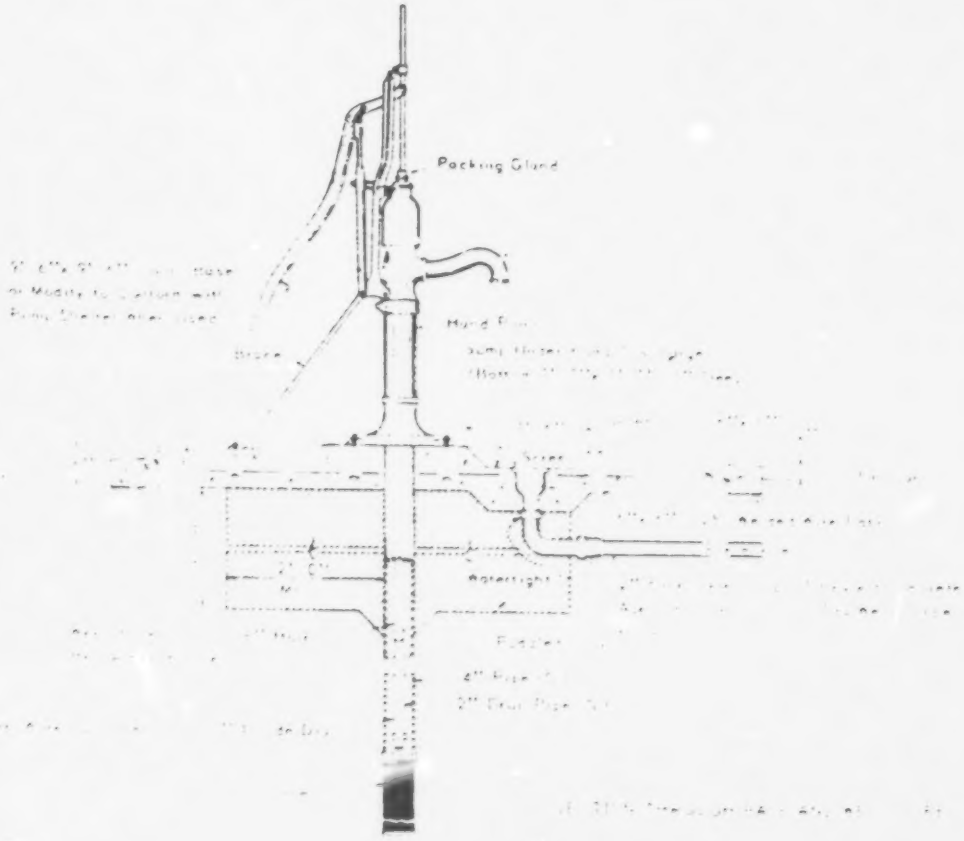
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 18. Picnic Shelter
MORRIS ISLAND CONSERVATION AREA	M.D.



MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 19. B-B-Que
MORRIS ISLAND CONSERVATION AREA	M.D.

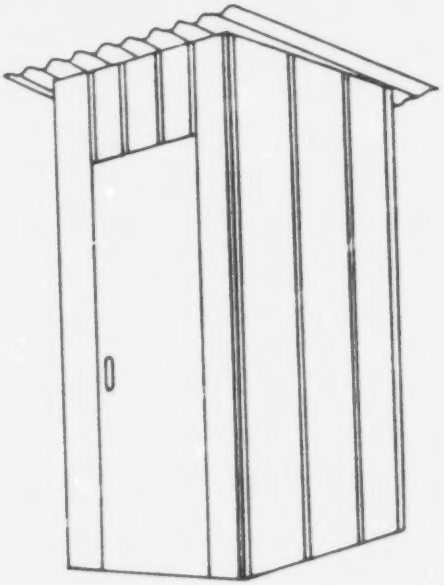


MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 20. Garbage Can	
MORRIS ISLAND CONSERVATION AREA		M.D.



MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 21. Well pump	
MORRIS ISLAND CONSERVATION AREA		M.D.

Isometric



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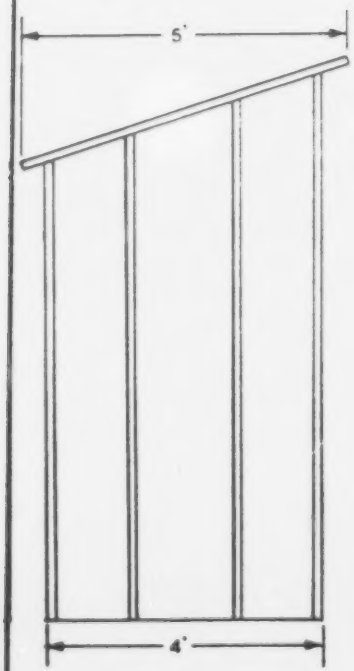
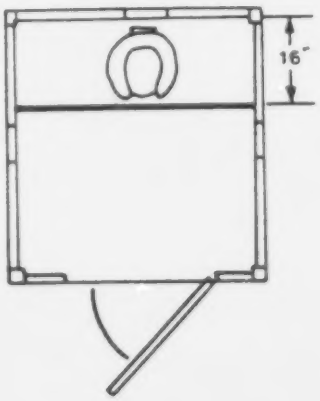


Detail



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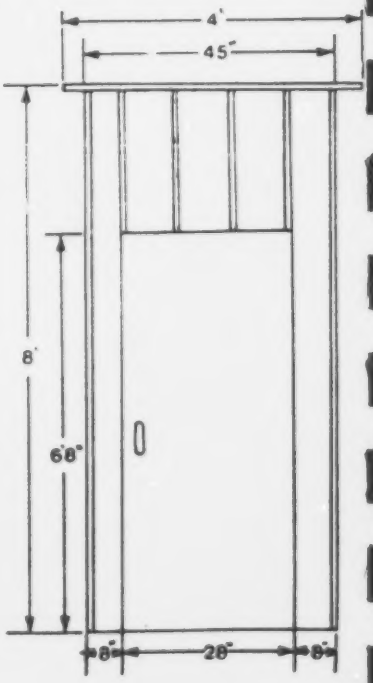
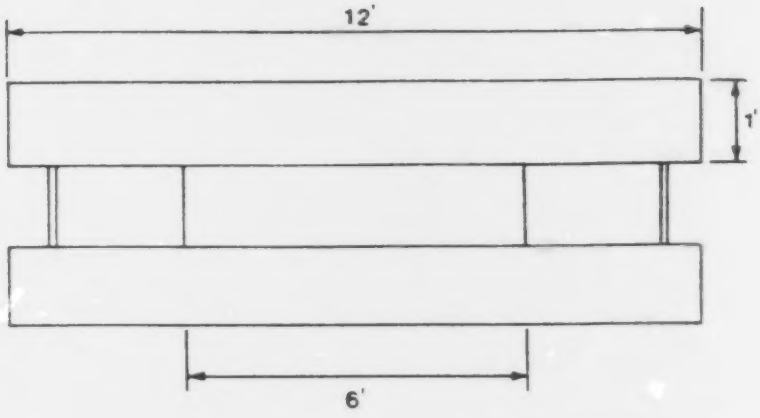
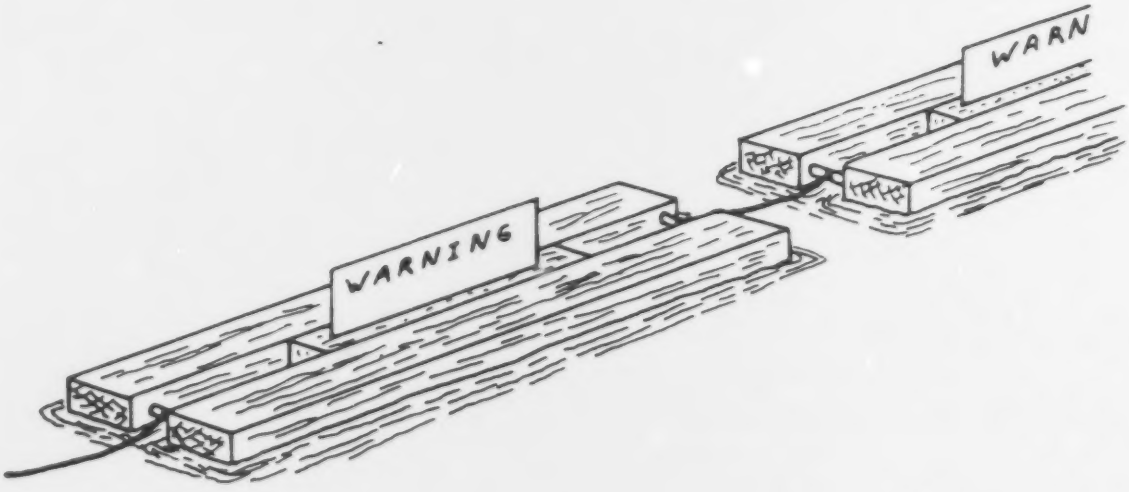
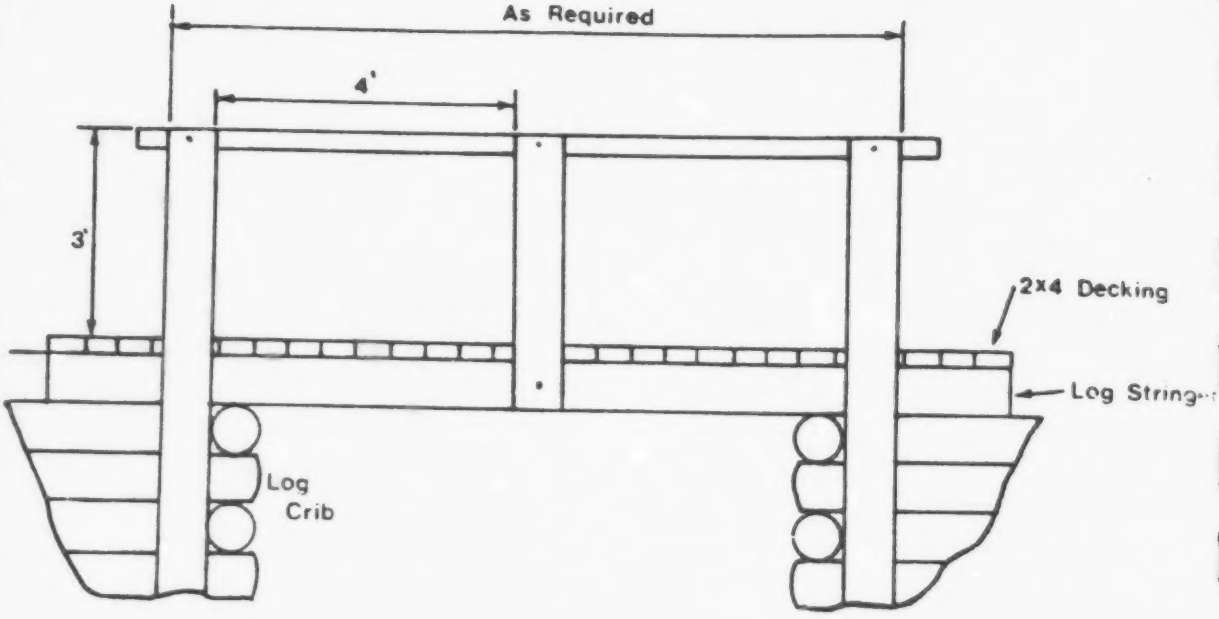


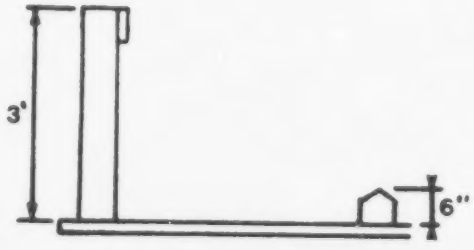
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 22. Pit-Style Privy
MORRIS ISLAND CONSERVATION AREA	M.D.

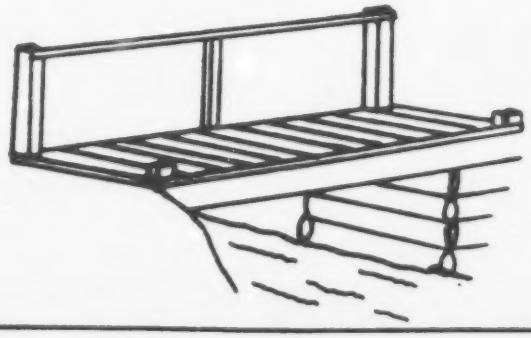




MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 23. Log Boom Barrie
MORRIS ISLAND CONSERVATION AREA	M.D.

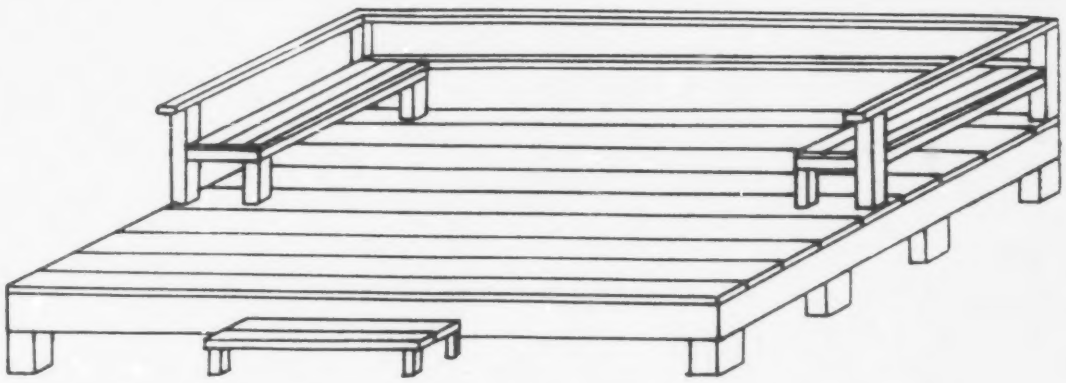






MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 24. Trail Bridge
MORRIS ISLAND CONSERVATION AREA	M.I.

Isometric



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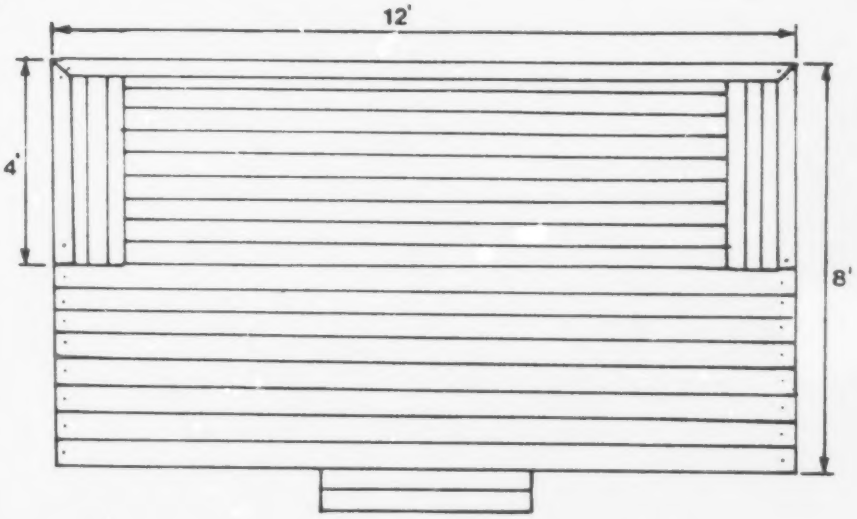

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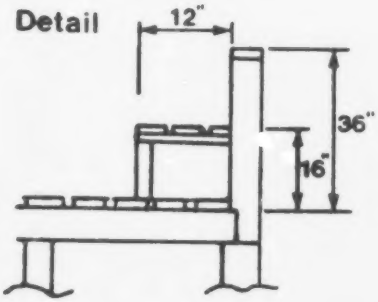

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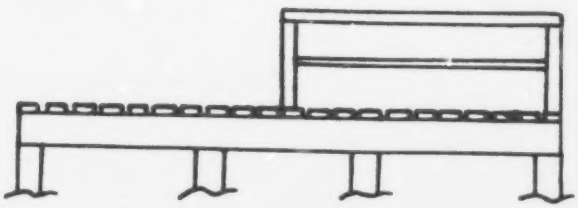
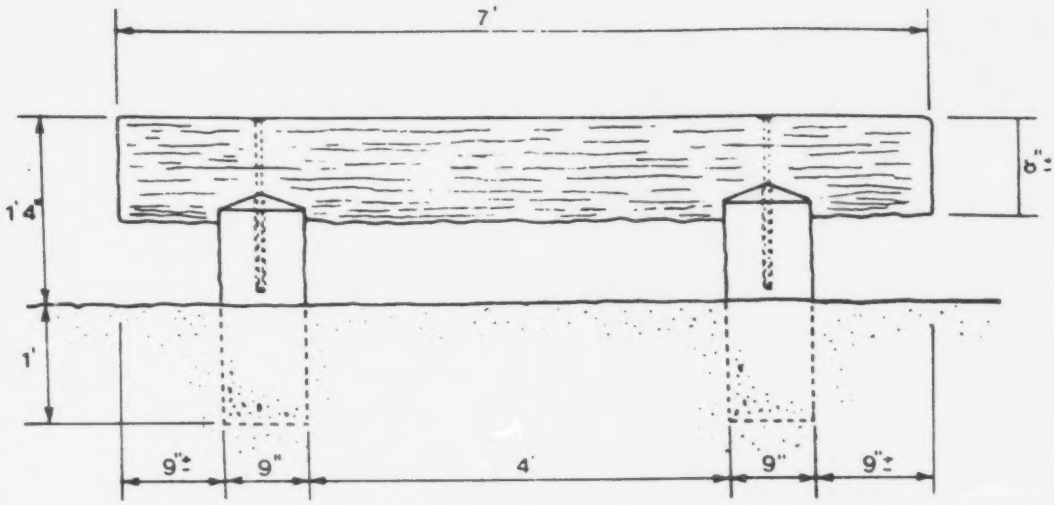
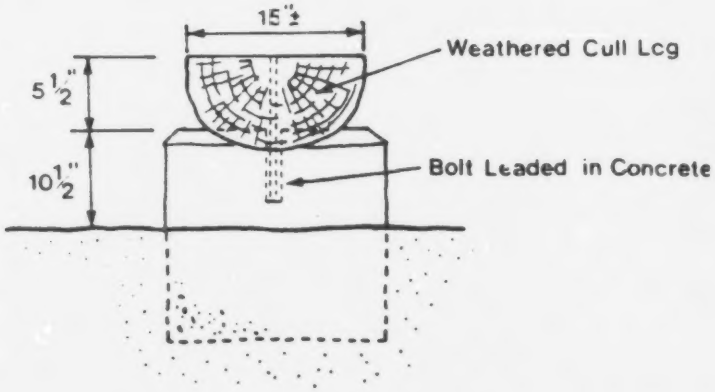
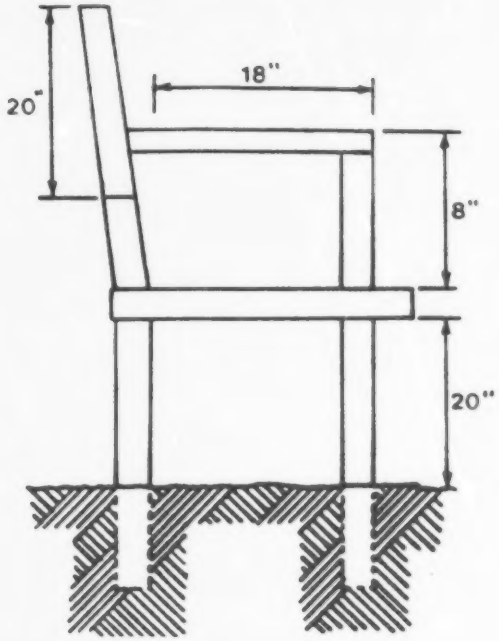


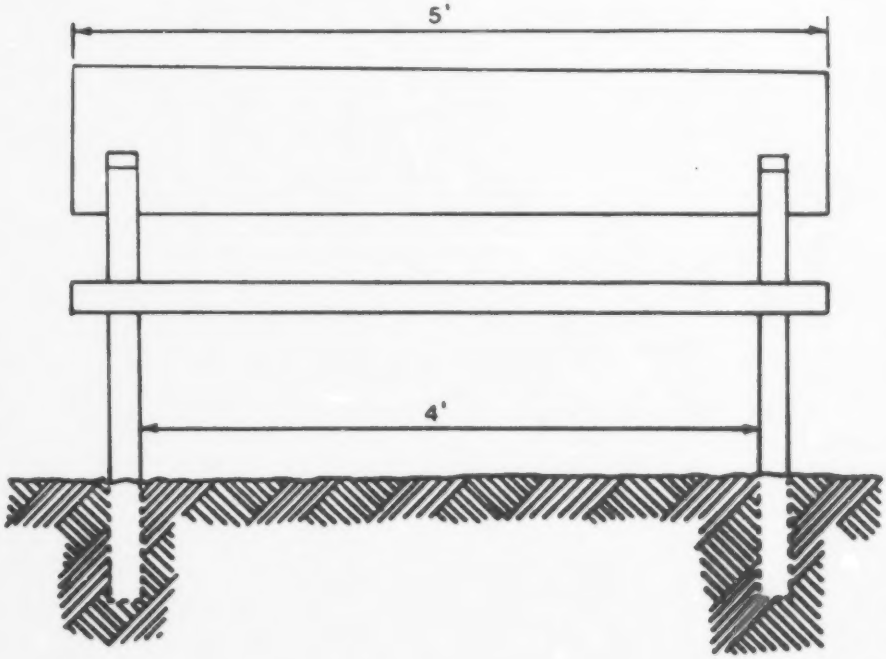
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 25. Trail Lookout
MORRIS ISLAND CONSERVATION AREA	M.D.





MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 26. Trail Bench
MORRIS ISLAND CONSERVATION AREA	M.D.

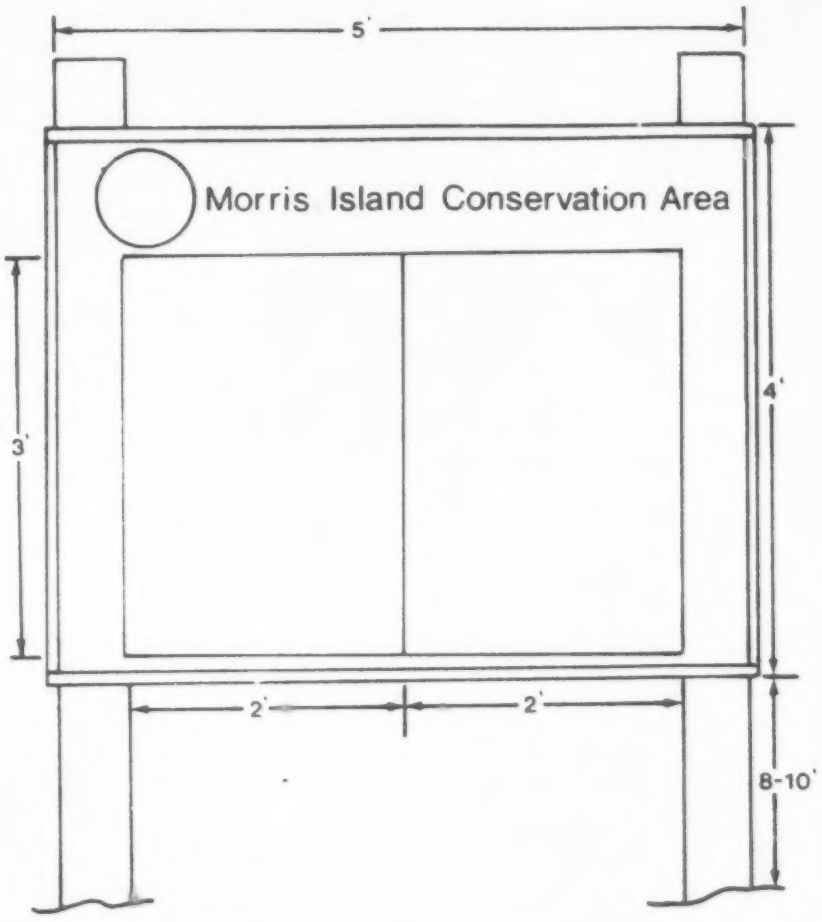




MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 27. Accessible Bench
MORRIS ISLAND CONSERVATION AREA	M.D.

MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 28. Entrance Sign
MORRIS ISLAND CONSERVATION AREA	M.D.

Front



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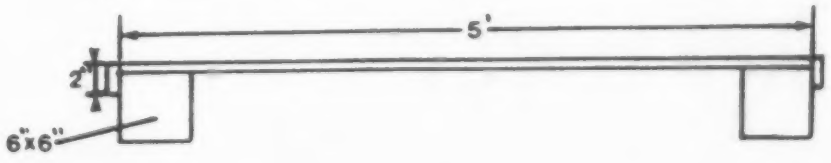
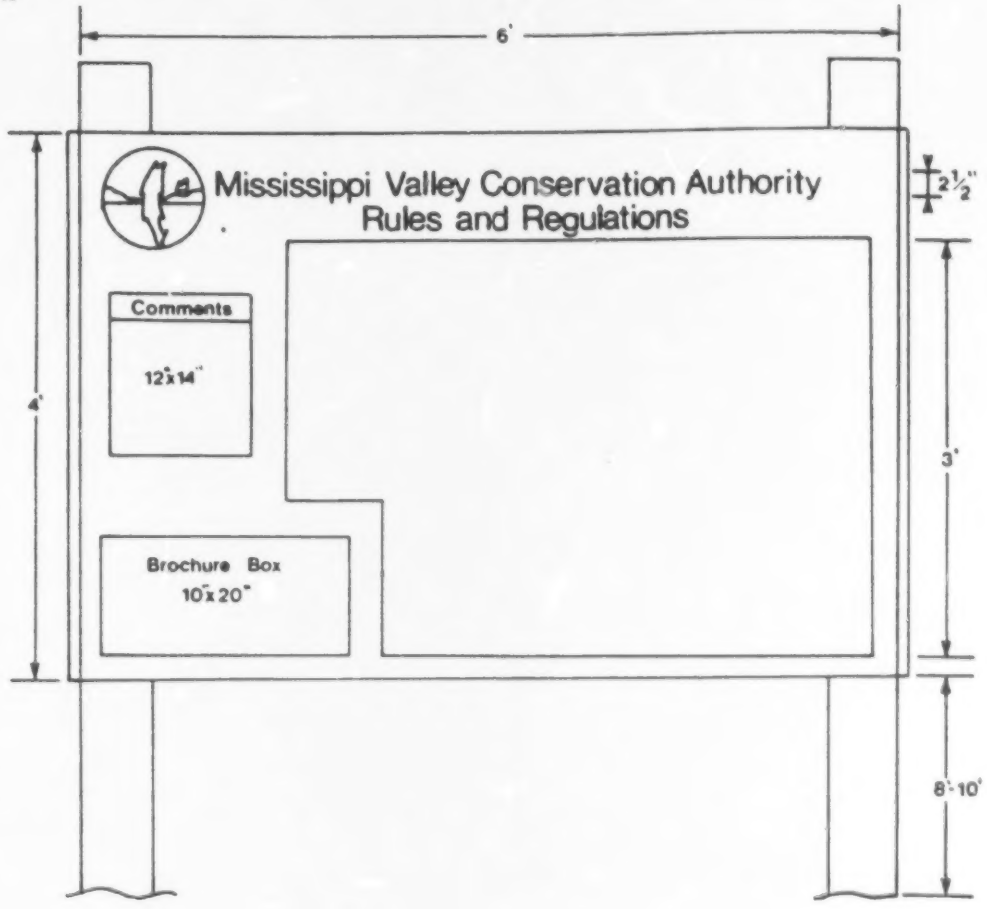
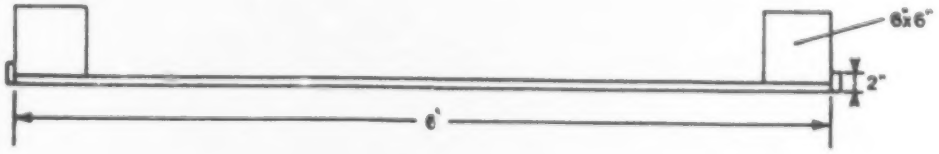


MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 29. Information Sign
MORRIS ISLAND CONSERVATION AREA	M.D.

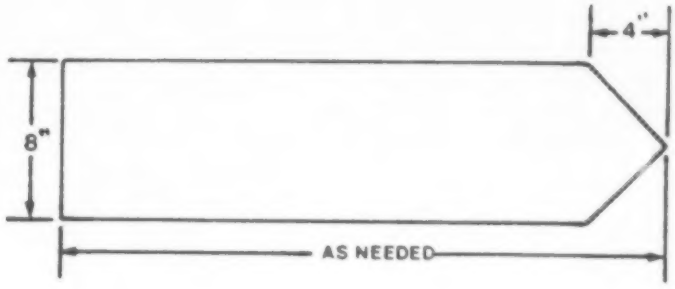
Front

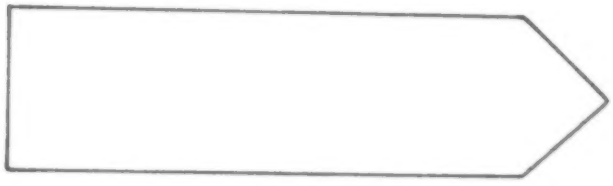


Top

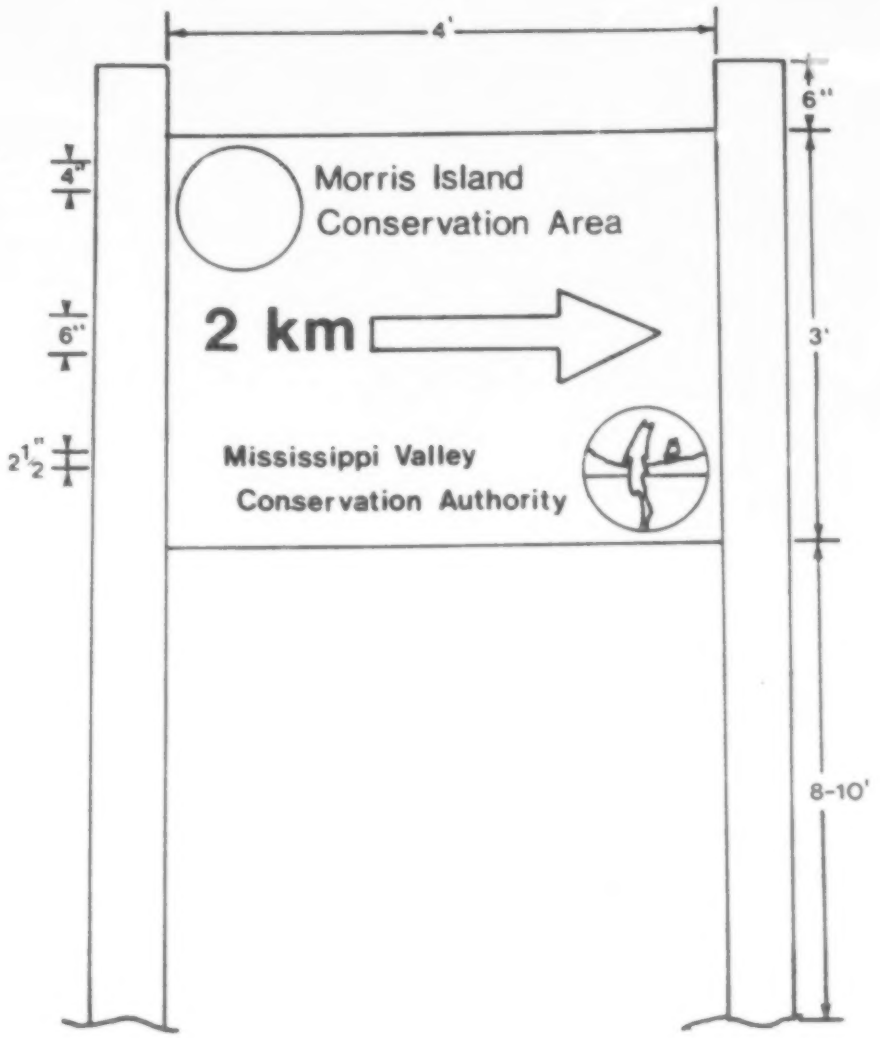


MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 30. Regulation Sign
MORRIS ISLAND CONSERVATION AREA	M.D.

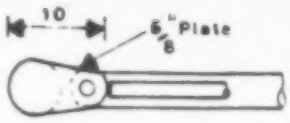




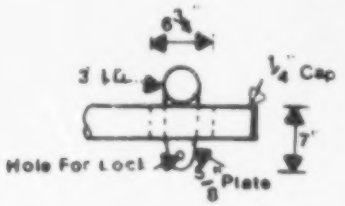
MISSISSIPPI VALLEY CONSERVATION AUTHORITY		
FEBRUARY 1987	Appendix 31. Directional Sign	
MORRIS ISLAND CONSERVATION AREA		M.D.



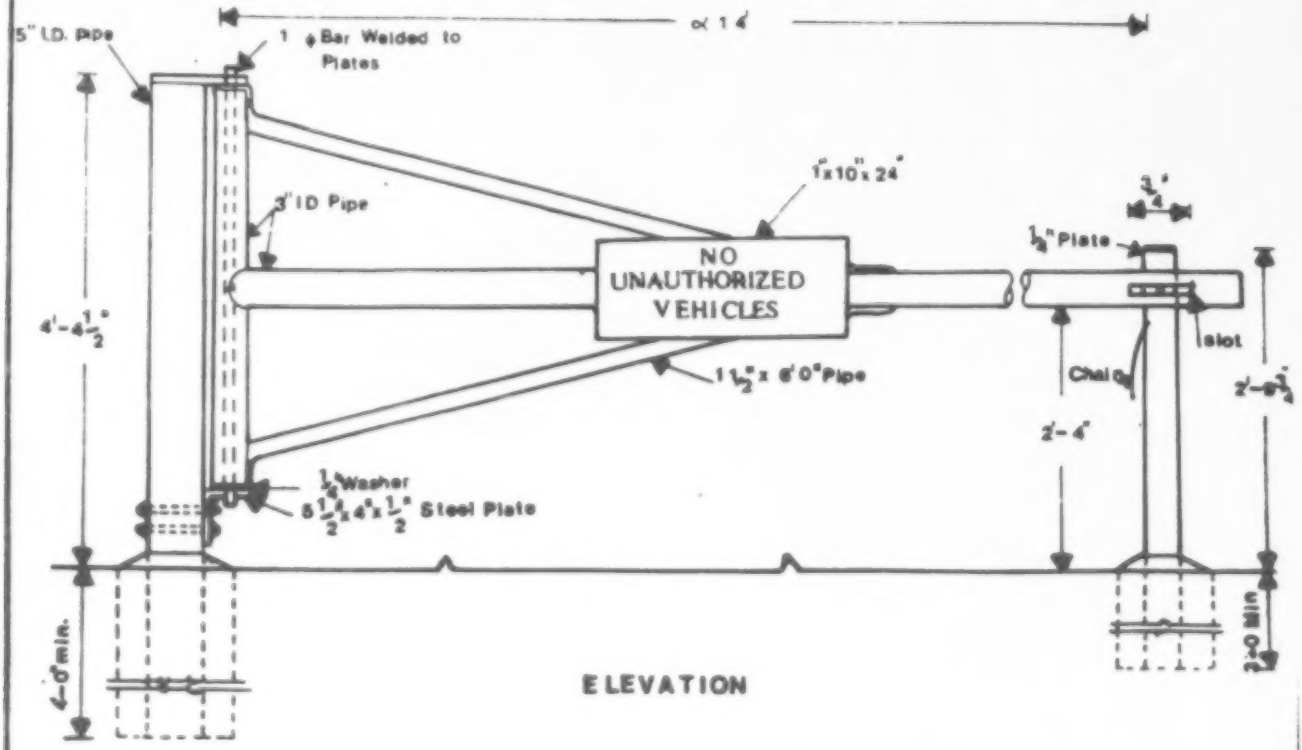
MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 32. MVCA Road Sign
MORRIS ISLAND CONSERVATION AREA	M.D.



PLAN of CAP PLATE

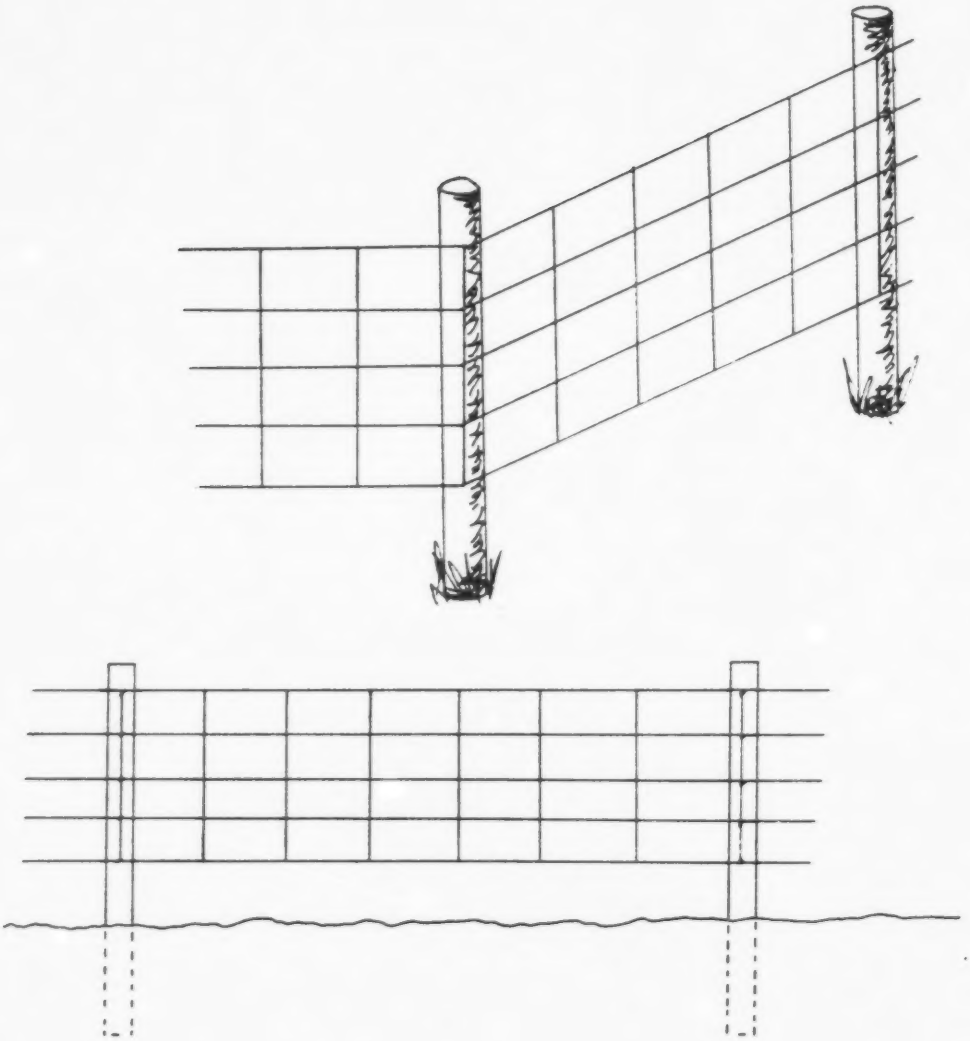


PLAN of LOCK POST



ELEVATION

MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 33. Locking Swing Gate
MORRIS ISLAND CONSERVATION AREA	



MISSISSIPPI VALLEY CONSERVATION AUTHORITY	
FEBRUARY 1987	Appendix 34. Perimeter Fence
MORRIS ISLAND CONSERVATION AREA	

Mississippi Valley Conservation Authority

Report on

MORRIS ISLAND CONSERVATION AREA

CAUSEWAY RECONSTRUCTION STUDY

May 1987

Gore & Storrie Limited GSS
Consulting Engineers & Architect

Gore & Storrie Limited G&S
Consulting Engineers & Architect

1987 05 19 727.02

Mr. Sandy Hay
Planning Supervisor
Mississippi Valley Conservation Authority
P.O. Box 268
Lanark, Ontario
K0G 1K0

Attention: Laura Cole
Conservation Planner

Dear Sir:

Re: Morris Island Conservation Area
Causeway Reconstruction Study

We take pleasure in submitting herewith two copies of our Final Report relating to the above. As discussed, we are enclosing reproducible copies of the drawings and originals of the report.

The assistance provided by your staff was most helpful and contributed to the overall content of the report. Should you require further assistance in preparing the Master Plan, or more information relating to any matters set out herein, please contact the undersigned at your convenience.

Yours very truly,

J. Shawn Gibbons, P.Eng.
Project Manager

JSG/dan
encl.

801-77 Metcalfe Street, Ottawa, Ontario, Canada K1P 5L6 (613) 238-7702

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CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

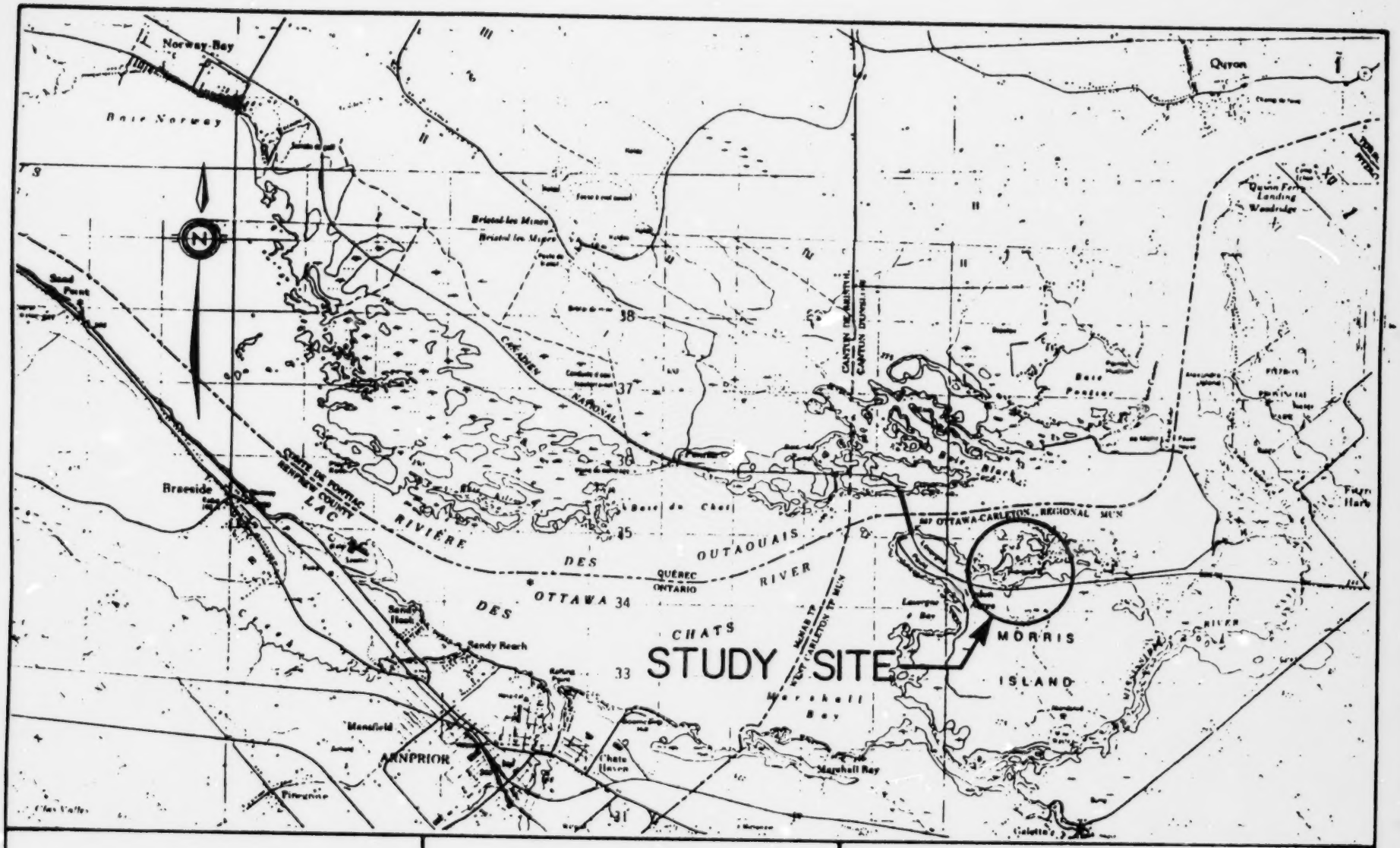
1.1 BACKGROUND

The Mississippi Valley Conservation Authority (MVCA) retained Gore & Storrie Limited, by letter dated February 20, 1987, to prepare a pre-design report on the feasibility of the Morris Island Conservation Area Causeway Reconstruction. This followed a letter proposal dated February 4, 1987. Our Letter of Authorization from the Mississippi Valley Conservation Authority, dated February 20, 1987, is enclosed as Appendix 1.

Generally, the project consists of rehabilitating an abandoned railway embankment to enable a handicap nature trail to be construction. The area, known as the Morris Island Conservation Area, is to be developed as a nature area. It is located northeast of Galetta in the Township of West Carleton. (see Figure 1).

The embankment has been abandoned for over forty years. This has resulted in its gradual degradation to the point where it now has been breached at one location and it would appear that other failures are possible.

An initial meeting was held on January 22, 1987, to view the site and discuss the approach. It was decided at that time, that the field survey work would be undertaken by the Conservation Authority. A second meeting, attended by Laura Cole (MVCA), Randy Morey (Golder Associates) and Shawn Gibbons of Gore & Storrie Limited, was held on January 28, 1987. It was noted that the embankment was located in an organic area and it was agreed that geotechnical field work would be undertaken in conjunction with this study.



Gore & Storrie Limited GS
Consulting Engineers & Architect

-1000 0 1000 2000 3000 4000 m

Mississippi Valley Conservation Authority

LOCATION PLAN

MORRIS ISLAND CONSERVATION AREA
CAUSEWAY RECONSTRUCTION STUDY

CHAPTER 2

METHODOLOGY

CHAPTER 2
METHODOLOGY

2.1 GENERAL APPROACH

As mentioned in earlier, the approach selected resulted from discussions with staff members of the MVCA and was chosen in order to provide the most expedient use of available resources. This report is intended to provide the Authority with a suggested approach and an estimate of costs regarding the rehabilitation of the embankment. Since the "level of service" to be provided by the embankment is much less than when originally constructed for rail service, a statistical approach to water levels and flow rates was not used. Rather, the approach selected was intended to provide a means of stabilizing the existing slope by minimizing the head created by fluctuating water levels due to operation of The Chats Falls Dam. It is understood that the embankment will be required to carry only occasional light traffic following construction. This will probably be a pick-up truck in the spring, for annual maintenance.

Since the area may be used as a handicap trail, it was decided to maintain a flat profile along the causeway. The alignment follows the original railway embankment for geotechnical reasons, which are expanded upon herein.

2.2 FIELD SURVEYS

Survey activities were conducted by the MVCA staff and consisted of obtaining cross-sections of the existing embankment at approximately 20m intervals. The general layout of the existing embankment is included as Drawing No. 1. The existing cross-sections are shown on Drawing No. 2. A power ice auger was used tc enable an estimate of pond invert to be determined under ice cover. Photographs of the site were taken during the initial site visit and additional photographs had been taken by MVCA staff during the summer of 1986. Selected photographs are appended to this report.

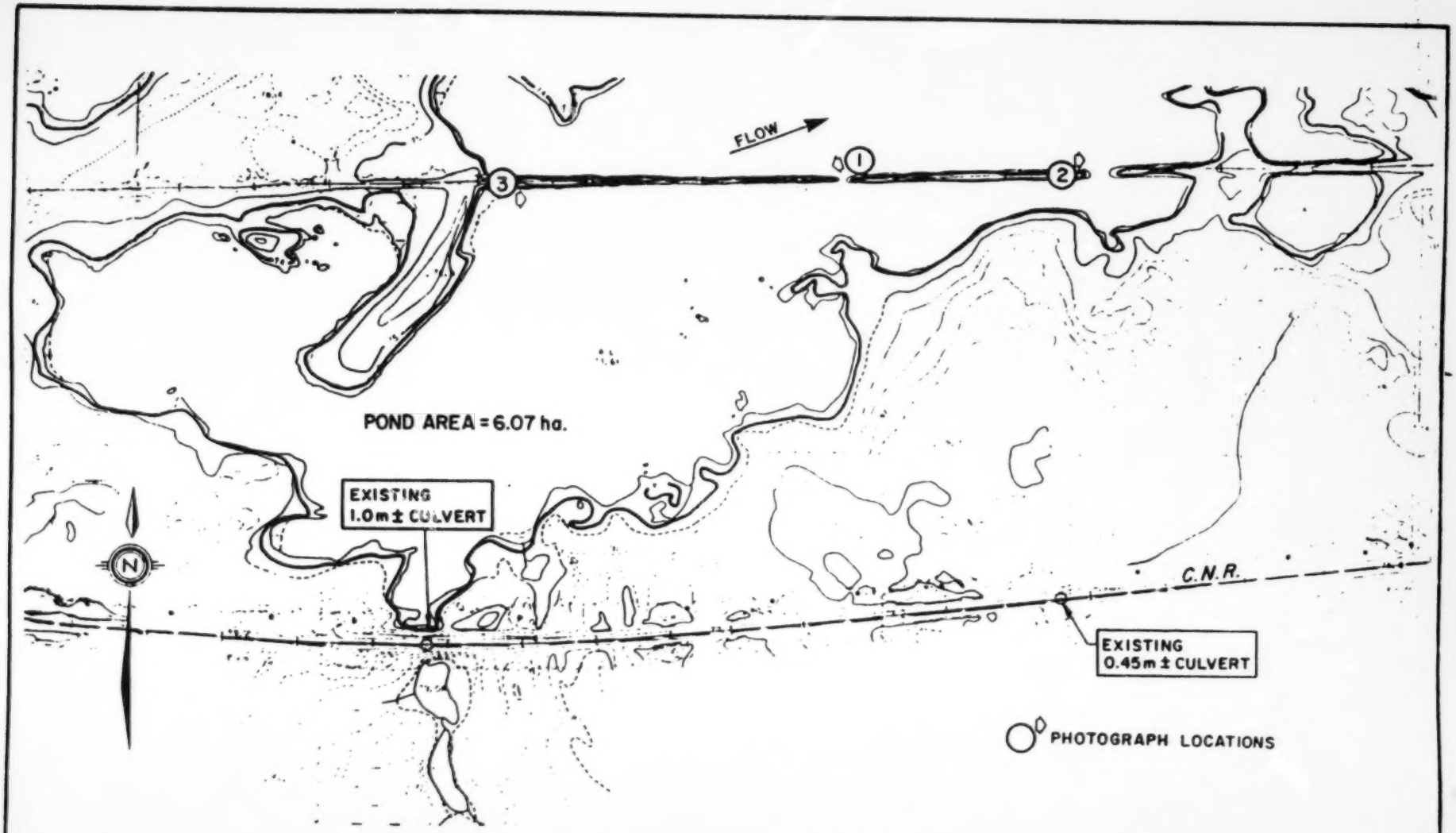
A local datum of 100.00m was assumed and all elevations shown for the cross sections and embankment profile are related to this. The approximate conversion to Geodetic Survey Canada is -24.71; i.e. 100.00m = 75.29m±GSC.

2.3 WATER LEVEL FLUCTUATIONS

The existing embankment forms part of a bay located on the northern bank of Morris Island. A small tributary stream flows into the bay through a culvert at the Canadian National Railway crossing. Most of the upstream watershed would appear to be marshy with the height of land being located at the approximate centre of the island at an elevation of 91m± (GSC). An attempt to determine the size of the upstream crossings was undertaken by MVCA staff on March 1, 1987. Figure 2 shows the location of upstream culverts as determined on that date. Based on a review of the culvert sizes that could be determined, it was concluded that inflows from upstream watersheds are not significant.

The operation of the Chats Falls Dam located approximately 3km east (downstream) of the site causes a daily fluctuation in the bay level. This in turn, causes flows to reverse through the embankment during periods of reservoir filling and vice versa during drawdown. Ontario Hydro has advised that the maximum fluctuation between operating levels is 74.02m and 74.30m (GSC). This translates to a fluctuation at the site of approximately 0.3m.

Ontario Hydro also advises that the maximum rate of drawdown is in the order of 0.01m/hr. MVCA staff observed level changes which appeared higher than this during field activities on March 3, 1987. Consequently, the embankment and crossing must be designed to accommodate normal drainage from Morris Island, and the effect of operating levels at the dam. In the matter of natural drainage, it is recommended that the crossing be equivalent in area to that currently under the new CNR alignment. A maximum rate of drawdown of 0.1m/hr was assumed to be an appropriate design condition. To accommodate reverse flow through the embankment, we have estimated the flow rate to equalize the levels as follows:



Gore & Storrie Limited GS
Consulting Engineers & Architects

m100 50 0 100m

Mississippi Valley Conservation Authority

SITE PLAN

MORRIS ISLAND CONSERVATION AREA
CAUSEWAY RECONSTRUCTION STUDY

- Pond area upstream of the embankment 6.07ha
- Maximum fluctuation in the level 0.50m
- Total volume to equalize ($60,700m^2$)(0.50m) = $30\ 350m^3$
- Time to equalize (0.5m @ 0.10m/hr) 5 hr
- Maximum equalizing flowrate $1.69m^3$/sec

It is recommended that the Authority confirm the actual rate of water level fluctuation at the site prior to proceeding to final design. We are recommending that 3-1 000mmØ CSP culverts be placed at the breach located in the central part of the embankment, as shown on Drawing No. 1, which is appended. It is also recommended that the Authority consider inlet improvements and seepage control on both ends in view of the reverse flow. Year round flows may necessitate gratings as well.

2.4 CONSTRUCTION CONSIDERATIONS

2.4.1 Rock Quantities

Some reduction in the quantity of rock fill material may be realized if some regrading of the embankment is undertaken. A preliminary estimate of cut and fill quantities, assuming the profile grade shown in Drawing No. 2, indicates a cut of approximately $175m^3$ and a fill of $315m^3$. If some of this material were placed along the central part of the existing embankment, a savings in the quantity of imported material might be realized. It is difficult to estimate what this reduction might be, since a roadway would be required to transport the material in any event. Accordingly, the estimate of costs assumes that imported material is used to bring the embankment to profile grade.

2.4.2 Construction Access

Construction access is possible from both sides of the causeway. This is desirable, as the culverts will probably be installed last, and heavy construction traffic should be minimized over them. It is expected that settlement will occur in the vicinity of the former

bridge crossing, as this area has never been subject to embankment loads. This fact, plus the improved hydraulics that would result from relocating the original crossing to the new existing central breach have resulted in the recommendation that the culverts be placed as shown. Some allowance for this settlement should be made and it may be necessary to add additional rock fill following construction. A contingency allowance has been made for this purpose.

2.4.3 Standards for Culvert Installation

Installation of the culverts should be as per OPSD 801.02, OPSD 802.01 and OPSD 803.03. The details relating to culvert installation are appended.

2.4.4 Walkway Width

A 3.5m platform was allowed for truck access and is considered minimum. Some variance in the walkway platform width may be noted over the culverts to allow viewing. Guardrails or handrails may be required along the walkway, depending on the final details selected. This will be addressed at final design.

2.4.5 Construction Schedule

It is estimated that 10 to 12 working days will be required for construction.

CHAPTER 3

RECOMMENDATIONS AND ESTIMATED COSTS

CHAPTER 3
RECOMMENDATIONS AND ESTIMATED COSTS

3.1 CULVERT REPLACEMENT

The layout of the proposed culvert replacement is shown on Drawing No. 1, which is appended. Installation should be as per OPSD 801.02, 802.01 and 803.03.

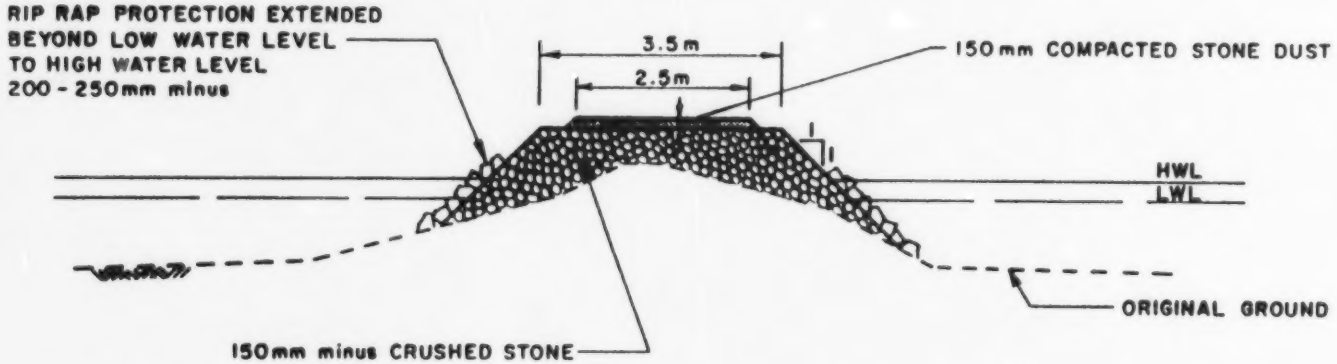
3.2 EROSION/EMBANKMENT STABILIZATION

The following recommendations are summarized from a report dated March 27, 1987 and prepared by Golder Associates. The report is included in Appendix 2, and direct reference should be made for additional details.

- The new embankment should be centered on the old embankment to minimize settlement.

- Two alternatives are proposed to reinstate the embankment. The first consists of using a core material of well graded 150mm minus and bringing the embankment to the proposed subgrade. To guard against wave action, a 450mm thickness of 200mm or 250mm minus well graded blasted rock would be placed along the exposed sideslopes up to high water level. Alternatively, the core could be made up entirely of 200mm or 250mm minus well graded blasted rock. No erosion protection would be necessary to guard against wave action, however, a granular blanket consisting of a 150mm thickness of 150mm minus would be necessary to prevent loss of the finer native material. Both options are presented as Figure 3A and 3B respectively. We have costed the first option (core made up of 150mm minus).

- Where the existing embankment will not be regraded, but rather stabilized or reshaped, the existing sideslopes should be protected by placing a 450mm thickness of well graded 200mm-250mm minus to the maximum expected high water level.



WATER LEVEL
FLUCTUATION 74.02 - 74.30 m
(1/100 YEAR HWL = 74.30m)

ALTERNATIVE 'A'

Gore & Storrie Limited GSS
Consulting Engineers & Architect

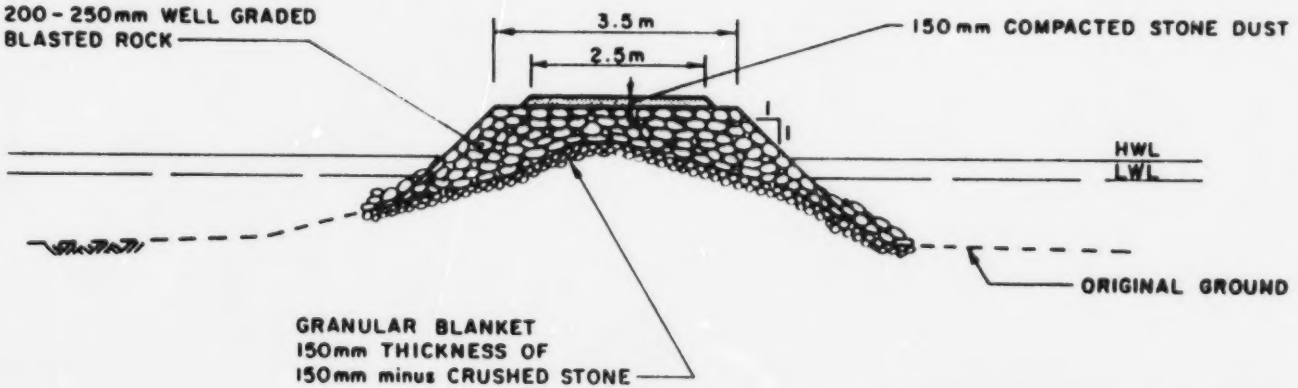
N.T.S.

Mississippi Valley Conservation Authority

TYPICAL ROCK FILL

MORRIS ISLAND CONSERVATION AREA
CAUSEWAY RECONSTRUCTION STUDY

FIGURE 7.1



WATER LEVEL
FLUCTUATION 74.02 - 74.30 m
(1/100 YEAR HWL = 74.30m)

ALTERNATIVE 'B'

Gore & Storrie Limited GSS

N.T.S.

Mississippi Valley Conservation Authority

TYPICAL ROCK FILL

MORRIS ISLAND CONSERVATION AREA
CAUSEWAY RECONSTRUCTION STUDY

- The culvert should be placed within the limits of the former embankment. Both ends of the culvert should be protected against scouring velocities by placing a 600mm thickness of riprap.

- The culvert outlet protection should be placed within the limits of the old embankment to minimize loss of material into the soft organics.

- Augerholes indicate little or no highly compressible material for 8.5m north of the centreline of the embankment and 3.0m south of the embankment.

- Substantial settlement can be expected in the area of the former bridge (near the east end of the site) where no previous embankment existed.

3.3 ESTIMATED COSTS

The main cost items associated with rehabilitating the causeway include shaping of the subgrade, supply and placement of rock fill and supply and installation of triple culverts and erosion and slope stabilization.

. Subgrade preparation (including mobilization, clearing of existing embankment and shaping existing embankment material)	$ 6,000
. Supply and place rock fill (including supply and placement of 1 000m^3 of 150mm minus @ $20/$m^3$)	20,000
. Supply and place erosion protection (including supply and placement of 500m^3 of 200-250mm minus @ $20/$m^3$)	10,000
. Supply and install (3-1 000mm Ø x 12.0m CSP with bevel ends and clay seals on upstream and downstream and bedding and backfill)	15,000
. Supply and place walkway material (including supply and placement of 200m^3 of stonedust with calcium chloride and compaction @$25/$m^3$)	7,500
Subtotal	$58,500
Contingency 20%	11,500
Total	$70,000

It should be noted that the above estimate of costs does not include upgrading access roads to the site but only the (400m±) causeway portion of the works. Depending on the gradation of the selected core material and the type of walkway chosen, a geotextile fabric may be necessary to prevent excessive loss of material into the subgrade.

CHAPTER 4

SUMMARY

CHAPTER 4
SUMMARY

Based on the foregoing, we would recommend that the Authority proceed as follows:

- An estimated level of funding of $75,000 including contingencies, should be secured.

- It will probably be necessary to undertake some maintenance of the walkway in the years following construction, as some settlement is expected. It is recommended that consideration be given to staging construction (ie. allow rock fill to stabilize and construct walkway in following year).

- Construction should be scheduled following passage of the annual high water level on the Ottawa River.

- The foregoing estimate of costs does not include consideration of access roads from either end of the site.

- Some supervision of the works should be undertaken especially during critical stages (ie. shaping of subgrade, erosion protection/slope stabilization, culvert bedding and installation). The services of a geotechnical consultant should be retained to inspect the proposed suppliers of granulars, and to inspect the installation of the rock fill by the contractor.

- The orientation of the culverts should be parallel to the main streamlines through the embankment.

- The Authority may wish to convert all assumed elevations to geodetic to ensure that the proposed works do not impact on established flood plain mapping.

. Given the uncertainty of the actual rate of drawdown at the site, it is recommended that this be determined prior to finalizing design. This determination may necessitate that an additional culvert be included to equalize the rate of drawdown.

APPENDIX 1

LETTER PROPOSAL

LETTER OF AUTHORIZATION

Gore & Storrie Limited G&S
Consulting Engineers & Architect

1987 02 04 727.02

DWS-t

Mr. Sandy Hay
Director of Planning
Mississippi Valley Conservation Authority
P.O. Box 268
Lanark, Ontario

Dear Sir:

Re: Morris Island Conservation Area
Township of West Carleton

Since our initial meeting with you on January 16, 1987, we have visited the site on two occasions. An initial visit was conducted on January 22, 1987. At that time, Paul Lehman, Sandy Hay, Laura Cole and the writer reviewed the site and discussed the proposed development. It is understood that the abandoned railway right-of-way is to be rehabilitated as a handicap trail. During this initial site visit, it was noted that the embankment had been severely eroded due to the daily fluctuations of the water level. This has been attributed to normal operating procedures at the Chats Falls Dam on the Ottawa River.

Following this preliminary site meeting, we recommended that a geotechnical consultant be retained to provide an opinion on the type of material and approach to be used in reinstating the embankment. It is noted that the walkway need only be wide enough to facilitate pedestrian access. However, construction activities will probably dictate a 4 to 5 m platform for access. On January 28, 1987, Randy Morey (Golder Associates), Laura Cole (MVCA) and the writer again visited the site. The MVCA survey crew had commenced cross sections at approximately 25m intervals. A power auger was used to obtain river bottom elevations below the ice level. The bulk of the erosion appeared to be occurring from the north side of the embankment and it was noted that the original ballast was a till material. The stream crossing will probably be located in the area where the embankment was recently breached. The original stream crossing will be abandoned as it no longer lies in the main streamlines.

Golder Associates have provided an estimate of manpower and costs to undertake some field work and to report on their findings. You will note that some assistance will have to be provided by the Authority as discussed. We concur with the approach as set out in their letter dated January 29, 1987.

.../2

Gore & Storrie will then provide the Authority with assistance in preparing a "pre-design" document which would include, plan, profile and a report outlining approach and costs. It is understood that the Authority will again provide assistance at the field survey and preliminary analysis components. We have attempted to set out an approach and costs for your review.

REPORT FORMAT

- Introduction
- Approach
  - assessment of flows
  - crossing size
  - erosion/embankment stabilization (Golder Associates)
- Construction Considerations
- Costs
- Summary & Recommendations

Appendices
- Golder Report
- Plan and Profile
- Typical Cross-section
- Operational data on dam
- Photographs, etc.

-10 copies of the report will be produced.

COSTS

Field work	$ 300
Hydrology/Hydraulics	600
Cost Estimation	600
Report Preparation	3,500
Disbursements	500
Subconsultant	1,200
	$6,200

(The above estimate is based on some assistance by the MVCA during the field survey component.)

We understand that you have a submission deadline of March 15, 1987, and we would undertake to provide you with a draft report by March 1, 1987. We would like to thank the Authority for providing this opportunity to once again work together.

Yours very truly,

J. Shawn Gibbons, P.Eng.
Project Manager

JSG/dan
attach.

Mississippi Valley Conservation Authority

P.O. BOX 268, LANARK, ONTARIO, K0G 1K0 — (613) 259-2421

File: XQ12

February 20, 1987

RECEIVED
GORE & STORE LIMITED
OTTAWA
FEB 26 1987

DWS	✓	EER	
JWS	-1	HTH	
JSG	4	DAN	
AVC			
FILE 727.02			

Mr. Shawn Gibbons, P. Eng.,
Gore & Storie Ltd.,
801-77 Metcalfe Street,
Ottawa, Ontario.
K1P 5L6

Dear Shawn:

Re: Morris Island Conservation Area,
Causeway Reconstruction Study

In accordance with your letter of 1987/02/04, I request that you undertake this project as outlined in your suggested work program. The upset limit is noted to be $6200.00.

In addition I would like you to confirm my understanding that you will be available as requested on an "as required basis" for the duration of this project.

This study will be an important component of the Master Plan. I would appreciate your close liason with Ms. Laura Cole, Conservation Planner, who is responsible for production of the Master Plan.

Thank You.

Yours very truly,

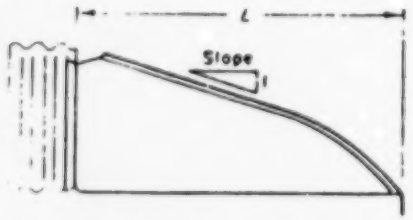
Shay

Sandy Hay,
Planning Supervisor.

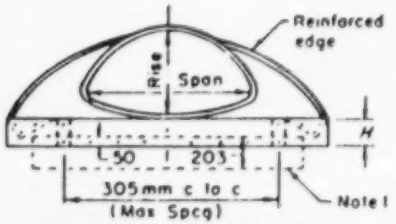
SH:cn
c. c. Dennis Murray, Regional Conservation Authorities Program Supervisor,
Ministry of Natural Resources, Kemptville.
Nigel Brereton, Manager,
Rural Policy, Regional Municipality of Ottawa-Carleton.

APPENDIX 2

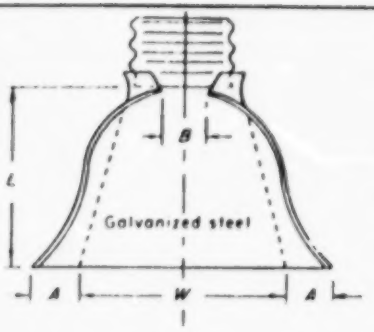
GOLDER ASSOCIATES REPORT



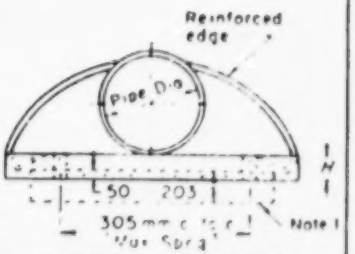
SIDE ELEVATION



FRONT ELEVATION



PLAN



FRONT ELEVATION

PIPE - ARCH

Span / Rise mm	Galv metal Thk mm	Dimensions (mm) A (25 mm ±)	B (Max mm)	H (25 mm ±)	L (38 mm ±)	W (50 mm ±)	Approx slope	Body
560 x 420	1.6	180		150	585	915	2.5	1 Pc
680 x 500	1.6	230		150	810	1220	2.5	1 Pc
800 x 580	—	—	—	—	—	—	—	—
910 x 660	2.0	250		150	990	1525	2.5	1 Pc
1030 x 740	2.0	305		200	1170	1905	2.5	1 Pc
1150 x 820	2.8	330		230	1345	2160	2.5	2 Pc
1390 x 970	2.8	455		305	1600	2285	2.5	2 Pc
1630 x 1120	2.8	455		305	1780	2590	2.25	2 Pc
1880 x 1260	2.8	455		305	1955	3200	2.0	3 Pc

CIRCULAR PIPE

Pipe Dia mm	Galv metal Thk mm	Dimensions (mm) A (25 mm ±)	B (Max mm)	H (25 mm ±)	L (38 mm ±)	W (50 mm ±)	Approx slope	Body
300	1.6	150	140	150	535	610	2.5	1 Pc
400	1.6	180	260	150	660	760	2.5	1 Pc
500	1.6	200	390	150	790	915	2.5	1 Pc
600	1.6	250	300	150	1040	1220	2.5	1 Pc
800	2.0	305	525	200	1295	1525	2.5	1 Pc
900	2.0	355	440	230	1525	1830	2.5	2 Pc
1000	2.8	405	350	280	1750	2135	2.5	2 Pc
1200	2.8	460	625	305	1980	2285	2.25	2 Pc
1400	2.8	460	850	305	2135	2590	2.1	2 Pc
1600	2.8	460	1075	305	2210	2895	1.96	3 Pc
1800	2.8	460	975	305	2210	3200	1.83	3 Pc
2400	2.8	460	1980	305	2210	3505	1.16	3 Pc

NOTES

1 Galvanized toe plate is available as an accessory, when specified on the order, and will be the same thickness as the end section.

A All 3 pc bodies have 2.8 mm sides and 3.5 mm centre panels. Multiple panel bodies have lap seams which are tightly joined by galvanized rivets or bolts.

B For CSP 1600 mm thru 2400 mm sizes, For CSPA 1630 x 1120 mm and 1880 x 1260 mm sizes, reinforced edges are supplemented with galvanized stiffener angles. When placing CSPA, reinf galv angles are also used under centre panel seams. Angles are to be attached by galvanized nuts and bolts.

C All dimensions are in millimetres or metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

END SECTION DETAILS

CORRUGATED STEEL PIPE

Date	1983 12 01	Rev	
Date			

OPSD - 801.02

RECEIVED
GORE & STORIE LIMITED
OTTAWA
MAR 31 1987
DWS
JMS
JSG
FILE 727.02

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

March 27, 1987

Our Ref: 871-2038

Gore & Storrie Limited
801-77 Metcalfe Street
Ottawa, Ontario
K1P 5L6

Attention: Mr. S. Gibbons, P.Eng.

RE: GEOTECHNICAL CONSIDERATIONS
PROPOSED CAUSEWAY RECONSTRUCTION
MORRIS ISLAND CONSERVATION AREA
GALETTA, ONTARIO

Dear Sirs:

This letter summarizes the results of field work carried out at the site of the proposed Morris Island Causeway Reconstruction and provides geotechnical recommendations for the proposed reconstruction work based on the field work results and a reconnaissance visit to the site by the undersigned.

It is understood that the existing causeway at this site was constructed in the early 1900's and has been abandoned for more than forty years. This project, which will be carried out by the Mississippi Valley Conservation Authority (MVCA), includes general widening of the existing badly eroded causeway, filling of existing openings in the causeway and the installation of culverts through the causeway. The causeway in question is about 375 metres in length. The culverts are to be installed in an existing breach in the causeway at about its midpoint. Plans are to reinstate the causeway to a platform width of about 3.5 metres for pedestrian traffic use.

A visit to the site on January 28, 1987 indicated that the major portion of the embankment/causeway has been eroded, probably by wave action, on the north side to the extent that the crest width is only about 1 metre. The remaining portion of the causeway consists of sand and gravel.

The purpose of the field work carried out at this site was to determine the presence of any highly compressible materials within the area of the proposed culvert installation. The field work was carried out on March 3, 1987 at which time some twelve augerholes and probeholes were put down using hand augering and sampling equipment.

LEGEND:

- d Denotes depth of granular (roadbed)
- f Denotes depth of frost treatmen. (Measured from profile grade).
- OD Denotes outside diameter.

NOTES:

1 CASE X

Pipe Dia ≤ 800 mm
cover material shall be granular, earth or suitable native backfill in earth fills, and granular in rock fills.

$C_1 = 0.50$ m for $h < 3.0$ m

$C_1 = 0.60$ m for $h \geq 3.0$ m

Pipe Dia > 800 mm
cover material shall be granular

$$C_1 = \frac{\text{Dia or Span}}{4} + 300$$

CASE X APPLIES:

In all rock fills.

2 CASE Y AND Z

Cover material shall be granular.

Pipe Dia ≤ 800 mm

$C_2 = 0.50$ m

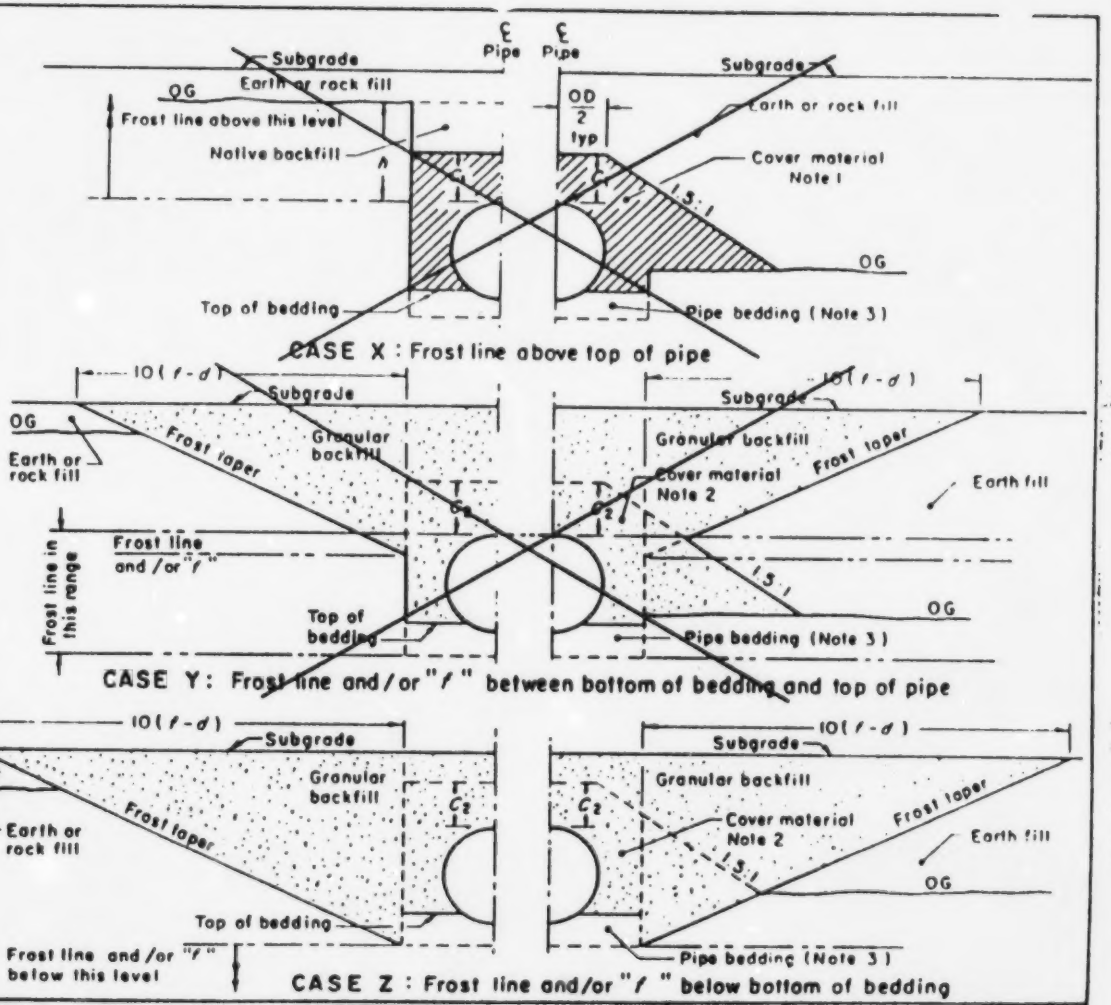
Pipe Dia > 800 mm

$$C_2 = \frac{\text{Dia or Span}}{4} + 300$$

Frost tapers are not required in rock fills.

3 Pipe bedding as per OPSD - 802.01 or OPSD - 802.02.

A All dimensions are in millimetres or metres unless otherwise shown.



ONTARIO PROVINCIAL STANDARD DRAWING	Date	1984 10 01	Rev	1
BACKFILL FOR PIPE CULVERTS	Date			
	OPSD - 803.03			

The location of the augerholes and probeholes are shown on the attached Sketch Plan, Figure 1. A detailed account of the soil conditions and water depths encountered at the test hole locations is given in the attached Record of Augerholes and Probeholes in Table I.

The results of the augerholes indicate that in general little or no highly compressible material exists for some 8.5 metres north and about 3 metres south of the centre line of the existing embankment. Outside of this area, however, a significant thickness of highly compressible organic material was encountered. Based on the augerhole results, it is considered that most of the highly compressible organic material within the embankment area was likely displaced laterally during the original embankment construction.

To minimize settlement of the reconstructed causeway, it is recommended that the causeway be centred on the centreline of the former embankment. Where existing embankment materials will be regraded to form a bed for the new embankment a 150 millimetre thickness of 150 millimetre minus well graded crushed stone should be placed over the prepared bed as protection against scouring of the sandy bed materials. The replacement embankment should be constructed using 200 or 250 millimetre minus crushed blast rock with side slopes no steeper than 1 horizontal to 1 vertical. Alternatively, the embankment could consist of 150 millimetre minus crushed stone. However, in this case and where the existing embankment materials will not be regraded to form a bed but rather be stabilized or reshaped, a minimum 450 millimetre thickness of well graded 250 or 200 millimetre minus protective rip-rap material should be placed on the side slopes to the maximum expected high water level. The use of 150 millimetre minus material for the construction of the embankment would also minimize the loss into the embankment of any finer surfacing granular materials.

The proposed culverts should be placed within the limits of the former embankment in order to minimize differential settlement along the culvert length. As the results of the augerholes and probeholes indicate that the ground surface is not level in the proposed culvert area the existing sand and gravel fill materials should be levelled to form a bedding for the culverts. In order to protect against scouring from the expected relatively high water velocities through the culverts, a protective 600 millimetre thickness of rip-rap material should be placed in a fan shaped area for a minimum 3 metres out from each end of the culverts. In order to minimize the loss of the rip-rap at the culverts into the soft organic material which exists outside of the former embankment, it is recommended that the culvert be positioned so that as much as possible of the rip-rap can be placed within the former embankment area.

It is understood that at one time a bridge was located near the east end of the existing embankment. As it is likely that any organic matter within the embankment alignment in this location has not been displaced or compressed substantial settlement of new embankment

...3

materials placed in the former bridge location should be expected. This could require topping up of the embankment in this area periodically following reconstruction of the embankment until such time as any organic matter has fully compressed under the new loading conditions.

We trust this letter contains sufficient information for your purposes. If you have any questions concerning this letter or if we may be of any further assistance during the construction stage of this project, please call our office.

Yours truly

GOLDER ASSOCIATES

C.R. Morey, P.Eng.

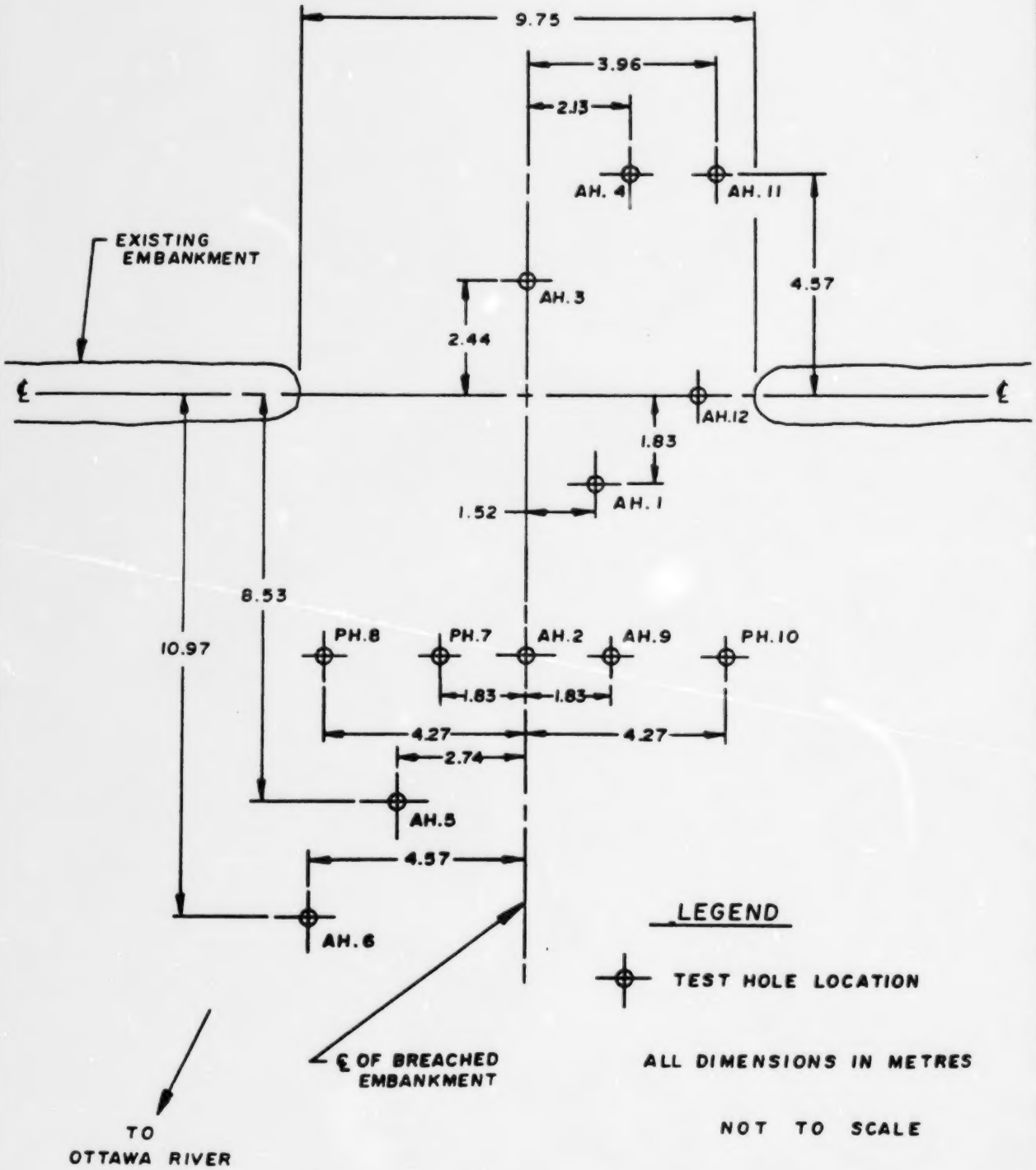
REGISTERED PROFESSIONAL ENGINEER
C. R. MOREY
PROVINCE OF ONTARIO

CRM:rb

Att. Figure 1
Table I

TEST HOLE LOCATION SKETCH PLAN

FIGURE 1



Date MAR 25, 1987
Project No 871-2038

Golder Associates

Drawn S.L.
Chkd

TABLE I

RECORD OF AUGERHOLES AND PROBEHOLES

Test Hole Number	Depth (Metres)	Description
AH1	0 - 0.76	WATER
	0.76 - 1.52	Grey brown sand and gravel some cobbles (FILL)
	1.52 - 2.74	Grey brown sand, some gravel (FILL)
	2.74	End of augerhole.
AH2	0 - 0.91	WATER
	0.91 - 1.98	Grey brown sand and gravel occassional cobbles (FILL)
	1.98 - 2.23	Grey brown sand (FILL)
	2.23	End of augerhole, refusal.
AH3	0 - 0.82	WATER
	0.82 - 1.71	Sand and gravel, some cobbles (FILL)
	1.71	End of augerhole, refusal.
AH4	0 - 1.22	WATER
	1.22 - 1.83	Sand, some gravel and organic matter (FILL)
	1.83 - 2.74	Soft dark brown ORGANIC MATTER
	2.74 - 3.05	SAND, some gravel
	3.05	End of augerhole.

TABLE I

RECORD OF AUGERHOLES AND PROBEHOLES

Test Hole Number	Depth (Metres)	Description
AH5	0 - 1.37	WATER
	1.37 - 2.74	Sand some gravel, trace organic matter at 2.4 to 2.7 metres depth (FILL)
	2.74	End of augerhole, refusal.
AH6	0 - 1.92	WATER
	1.92 - 2.74	Sand, some gravel, some organic matter with depth (FILL)
	2.74 - 3.20	Dark brown ORGANIC MATTER
	3.20 - 3.35	SAND, some gravel
	3.35	End of augerhole.
PH7	0 - 1.07	WATER
	1.07	End of probehole, ground surface.
PH8	0 - 0.76	WATER
	0.76	End of probehole, ground surface.
AH9	0 - 0.61	WATER
	0.61 - 1.22	Sand, some gravel (FILL)
	1.22	End of augerhole.

TABLE I

RECORD OF AUGERHOLES AND PROBEHOLES

Test Hole Number	Depth (Metres)	Description
PH10	0 - 0.52	WATER
	0.52	End of probehole, ground surface.
AH11	0 - 1.52	WATER
	1.52 - 3.35	Soft dark brown ORGANIC MATTER
	3.35	End of augerhole.
AH12	0 - 0.30	WATER
	0.30 - 1.62	Sand and gravel, some cobbles (FILL)
	1.62	End of augerhole, refusal.

APPENDIX 3

QUANTITY CALCULATIONS

MORRIS ISLAND - END AREA QUANTITY CALCULATIONS

Station	Length m	Cut m^2	Cut Volume m^3	Fill m^2	Fill Volume m^3	Totals
0+000		0.84		0.168		
	20		11.4		7.3	
0+020		0.30		0.562		
	20		3.0		24.37	
0+040		0		1.875		
	20		5.5		24.53	
0+060		0.55		0.578		
	20		15.84		9.62	
0+080		1.034		0.384		
	20		11.18		16.18	
0+100		0.084		1.234		
	20		1.88		22.9	
0+120		0.104		1.056		
	20		1.84		15.28	
0+140		0.080		0.472		
	20		4.0		12.72	
0+160		0.32		0.80		
	20		3.2		16.6	
0+180		0		0.86		Cut = 172.4 m^3
	8		0		17.44	
0+188		0		3.50		
	12		0.30		30.996	Fill = 310.5 m^3
0+200		0.05		1.666		
	20		4.94		19.6	
0+220		0.444		0.294		
	20		7.24		14.74	
0+240		0.28		1.18		
	20		3.92		25.36	
0+260		0.112		1.356		
	20		6.52		23.96	
0+280		0.54		1.04		
	20		17.2		13.36	
0+300		1.18		0.296		
	15		16.005		3.645	
0+315		0.954		0.19		
	10		4.77		1.83	
0+325		0		0.176		
	13		0.065		5.304	
0+338		0.01		0.64		
	15		12.975		4.8	
0+353		1.72		0		
	30		40.65		-	
0+383		0.99		0		

APPENDIX 4

PHOTOGRAPHS

APPENDIX 5

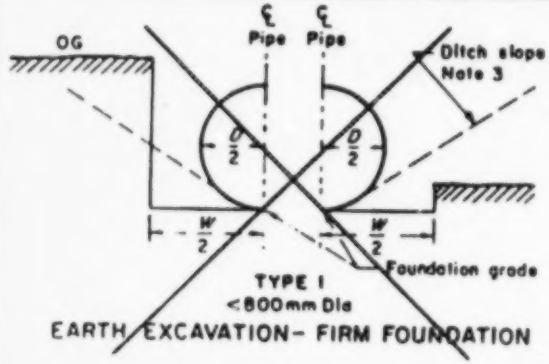
OPSD SPECIFICATIONS

PHOTOGRAPH 1
BREACH IN EMBANKMENT AND PROPOSED LOCATION OF CULVERT

PHOTOGRAPH 2
ORIGINAL CROSSING LOCATION

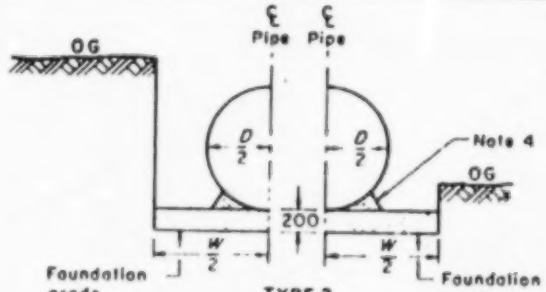
PHOTOGRAPH 3
VIEW OF EMBANKMENT LOOKING EAST

FIGURE 4



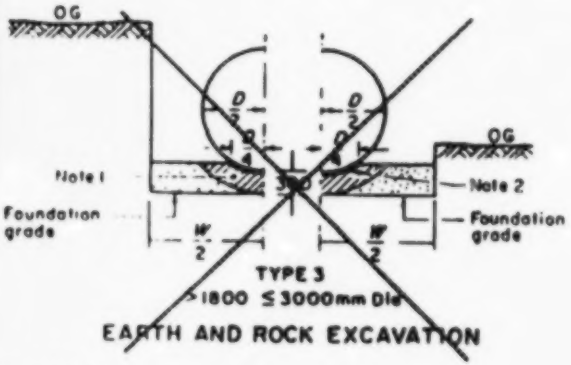
TYPE 1
<800mm Dia

EARTH EXCEPTION- FIRM FOUNDATION



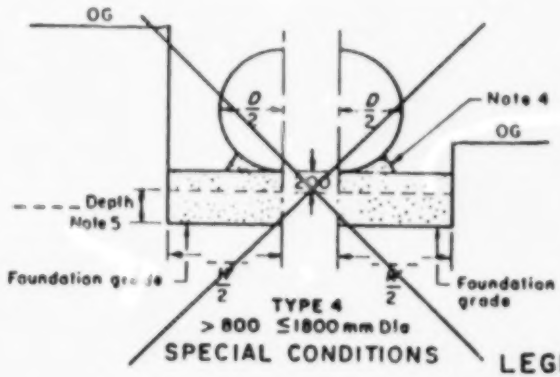
TYPE 2
EARTH >800 ≤1800 mm Dia
ROCK ≤1800 mm Dia

EARTH AND ROCK EXCAVATION



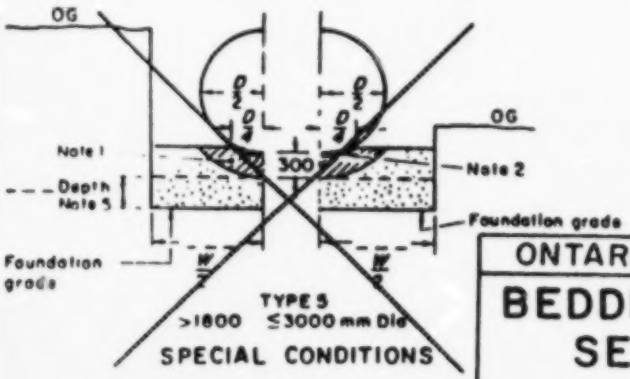
TYPE 3
>1800 ≤3000mm Dia

EARTH AND ROCK EXCAVATION



TYPE 4
>800 ≤1800 mm Dia

SPECIAL CONDITIONS



TYPE 5
>1800 ≤3000 mm Dia

SPECIAL CONDITIONS

SPECIAL CONDITIONS

Sta	Depth	Width

NOTES:

1. Granular material 300 mm from surface of pipe to be uncompacted.
2. For type 3 and 5 pipe bedding to be shaped to receive the invert of the pipe for a width of D/2.
3. Installation in regular ditch cross-section is allowed at private entrances only.
4. Haunches must be backfilled with granular material and compacted to 100%.
5. Depth as directed by the Regional Geotechnical Office.

A Compaction of bedding material 100%, except for area referred to in note 1.

B Backfill as per OPSD-803.03 and OPSD-803.04

C Stone size within 300 mm of the surface of the pipe shall not exceed 75 mm.

D All dimensions are in millimetres or metres unless otherwise shown.

LEGEND:

D – Diameter

W – Minimum width of bedding

~~*D* + 800 mm for *D* ≤ 800 mm~~

1.67 x *D* for *D* > 800 mm & <1800 mm

~~*D* + 1200 mm for *D* ≥ 1800 mm~~

ONTARIO PROVINCIAL STANDARD DRAWING

BEDDING FOR CIRCULAR PIPE SEWERS AND CULVERTS

FLEXIBLE PIPE

Date	1984 10 01	Rev	1

Date _____

OPSD-802.01